SHINGLE CREEK FLOOD PLAIN STUDY

by

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Introduction and Purpose:

This project is a continuation of the Shingle Creek Flood Plain Study after the work done by Reynolds, Smith and Hills (RS&H). A 100-year flood hazard area along the main channel of Shingle Creek from its outlet in Lake Tohopekaliga on the south to Old Winter Garden Road in the City of Orlando was delineated and presented in the "Preliminary Engineering Report" dated September, 1974, by RS&H.

The 100-year design flood was computed by means of the hydrometeorological approach, the computation of design hydrographs from rainfall for 54 sub-basins in the basin, and the flood routing of these hydrographs through the natural flood plain under committed land use conditions (Appendix C).

The selection of the 100-year design storm, the development of design hydrographs for the 54 sub-basins from the unit hydrograph principle, the flood routing procedure, the backwater computation to determine the 100-year flood profile, and the delineation of the flood hazard area were presented in the above mentioned report.

However, the design flood stage used to compute the backwater profile was based on a design flood stage of 57.0 feet m.s.l. in Lake Tohopekaliga. District hydrologists feel that the 100 year stage on Lake Tohopekaliga will be 57.5 feet m.s.l. or possibly higher. Therefore, a new flood plain study under this new design flood stage at the lake was made and is intended to provide the basis for development of a water management plan for the watershed.

The scope of work involved in this study can be described in two phases:

Phase I:

a. Determine a new 100-year flood profile and flood hazard area for the

Shingle Creek basin, using the methodology established in the RS&H report.

b. Compare the 100-year flood hazard area, and flood profile with the results presented in the RS&H report.

c. Delineate the encroachment line on the flood plain area by allowing 0.5 feet rise of water surface above 100 year profile.

Phase II:

a. Development of the design water surface profile with channelization north of the Florida Turnpike.

b. Determine the effect on the flood hazard area under the channelization.

c. Delineate the encroachment line on the flood plain area by allowing 0.5 feet rise above 100 year profile under the channelization.

General Approaches:

The information used in Phase I was basically available from RS&H. The x-sections along the creek and the bridge sections were obtained from RS&H. The roughness coefficient was shown on each cross-section. The runoff distribution along each reach at various inflow points was available from the RS&H report. Therefore, the primary work involved in Phase I was to set up an input data system in machine-readable form according to the requirement of the HEC-2 program. The HEC-2 program computes backwater profiles for river channels of any cross-section for either subcritical or supercritical flow conditions. The effects of various hydraulic structures such as bridges, culverts, weirs, embankments and dams may be used for various frequency floods for both natural and modified conditions. In setting up the input job stream for this study, the energy losses due to pier shape, friction, exit, contraction and expansion, etc. were considered by using special or normal bridge routine and roughness coefficient cards. A transition at every 50 feet above or below a highway bridge was provided. The selection of a special or normal bridge routine was based on bridge cross-sectional information. If the bridge geometry could be approximated by a regular shape such as trapezoidal or rectangular, then a special bridge routine was used. Otherwise, a normal bridge routine was used for proper computation of energy losses through the bridge.

The delineation of the encroachment line on the flood plain areas was determined by using method 4 of the HEC-2 program. This method is based on an assumption that an equal loss of conveyance occurs on each side of the channel due to a 0.5 feet rise of the backwater profile. Normally, if half of the loss cannot be obtained on one overbank, the difference will be made up, if possible, by the other overbank. No encroachment will be allowed to fall within the main channel. The encroachment station on each x-section is available on the computer output. The cross-sections were plotted on Quad Sheets. The encroachment line was then linked together with the aid of the 5 ft. contour interval map. The elevation shown on the x-sectional map was also used to help judge the reliability of the contour map.

Phase II was approached in slighlty different fashion from Phase I. Multiple surface profiles for various discharges to establish stage-discharge relationships and stage-storage relationships at every reach were computed and used to develop storage-discharge relationships for the channelization north of the turnpike. The following steps were taken to establish such relationships.

(1) The extent of channelization north of the turnpike was based on a 30% Standar Project Flood design section which is of approximately a 10 year frequency for the area.

(2) The design sections under the highway bridges were established by assuming two feet of excavation at the center portion of the bridge section, with a 2 horizontal to 1 vertical side slope to the embankment of the bridge. It was felt that this improvement for the bridge section would not cause any damage to the substructures of the existing bridges. A list of channelized x-sections is contained

in Table 1 of Appendix A.

(3) The storage-discharge relationship was developed by running the HEC-2 program to obtain multiple surface profiles for Q = 500, 1000, 1500, 2000, 3000, ..., 9000 c.f.s. at different initial stages such as 54.0 and 57.5 ft. m.s.l. The amount of discharge at the middle, and upper reach was varied to a combination of 3000, 2000, 1000, 500 and 300 c.f.s. The purpose of this was to estimate the variable backwater effects, channel storage, and return of overbank flow on these reaches.

(4) A flood routing computation was performed for all 21 reaches using the storage-discharge relationship described above. A routing program based on the modified pul method for a particular river reach was developed.

$$\frac{(I_1 + I_2)}{2} \Delta t - \frac{(O_1 + O_2)}{2} \Delta t = S_2 - S_1 = \Delta S \qquad (1)$$

where

Δt = time interval $t_2 - t_1$

I_1 = inflow at time 1 (rate)

I_2 = inflow at time 2

O_1 = outflow at time 1

O_2 = outflow at time 2

S_1 = storage at time 1 (volume)

S_2 = storage at time 2

ΔS = change in volume of storage for the time interval

This equation can be further rewritten in the following manner:

$$\frac{I_1 + I_2}{2} + \frac{S_1}{\Delta t} - \frac{O_1}{2} = \frac{S_2}{\Delta t} + \frac{O_2}{2} \qquad (2)$$

Knowing the relationship between discharge and storage for each reach, the developed routing program based on Eq. (2) was applied to route the flood combined with the developed design flood hydrograph from each sub-drainage basin given in the "Preliminary Engineering Report" of RS&H. These local design flood hydrographs were added as local inflow to the reach before flood routing, or to the outflow from the reach after flood routing. A flow chart for this procedure is shown on Figure 1.

(5) The flows used to determine the maximum water surface elevation along the creek were determined by using the peak discharge from the inflow-outflow routed design flood hydrograph mentioned in Item 4.

(6) Discharge figures close to the previous routed peak discharge at each reach along the creek were used to run multiple surface profiles. Then, the procedures used in Item 3 were used to refine the outflow-storage relation for each reach. A new routing process was done the same way as described in Item 4 to compute a new set of design flood distributions along the creek.

(7) This new set of design flood distributions at each reach was used in the backwater computations by using the HEC-2 program. A new 100 year flood profile and delineation of flood hazard areas were determined in the same fashion as described in Phase I.

Assumptions:

The following assumptions were made during the process of this study:

1. The bridges and waterways were not obstructed by trees, brush or other debris during the flood period.
2. All bridges over Shingle Creek were of sufficient strength to resist such a major flood.
3. A transition at 50 feet above or below every bridge was either provided or based on the extension of the last cross-section available. A deep canal section below the channel bottom in the vicinity of B-2, B-3, Bee Line connector and Conway Road bridges was assumed to be maintained

in its existing condition. However, such assumption was not necessary under the Phase II study due to the fact of channelization in this portion of the creek.

Results and Discussion:

A. Results from Phase I Study

The basic difference between this study and that of RS&H can be briefly stated in two major items:

Item 1. An initial stage of 57.5 feet m.s.l. at the outlet of Shingle Creek to Lake Tohopekaliga was used instead of the 57.0 feet m.s.l. used by RS&H.

Item 2. The encroachment line on 100 year flood hazard along the Creek was delineated in this study by allowing a 0.5 ft. rise of water surface above 100 year flood profile. This delineation was not requested as a part of the RS&H study.

(a) Flood profiles:

As mentioned previously, the source of data for HEC-2 program was the same for both studies except for some minor adjustment of cross-sections that did not extend completely across the floodplain, and the transitional sections upstream and downstream of highway bridges. Therefore, one would expect the results of both studies to be similar. The results of the backwater profile for the 100 year flood is plotted on Figure 2 through Figure 6 along with the results from the RS&H study. In general, the results from both computations are very close except at the locations of highway bridge crossings. The special bridge and normal bridge routings that were used in this study depend on the available existing geometry of the bridge cross-sectional information. The special bridge routine was used on all bridges by RS&H. However, the difference between the two are within 0.5 ft. except for State Road 530 bridge near Section 7. A transitional cross-section at a distance of 50 feet from the bridge was assumed by using the same cross-section as Section 6 in this study instead of Section 7 used by RS&H, and the net area under the bridge was 2,277 sq. feet instead of the 1,462 sq. feet used by RS&H. Due to these differences in bridge sections, a greater difference in the backwater computation resulted. However, the backwater profile became close again for the following reaches, with a computed stage at the upper end of 97.90 ft. m.s.l. as compared to 97.50 ft. computed by RS&H.

The backwater computation indicates that a number of bridges will be submerged during a 100 year flood. These bridges are Taft Vineland Road, Sand Lake Road, Americana Blvd., Mc'leod Road (SR. 446). A number of bridges will be partially submerged. They are the Old Tampa Highway, S.C.L. Railroad, Powerline Road, Road "E" Bridge (B-2), Road "D" Bridge (B-3), Florida Turnpike, Oak Ridge Road, Abilene Trail etc. In other words, twelve of the nineteen existing bridges crossing Shingle Creek will be either submerged or partially submerged under this 100 year flood. Those bridges with timber piles, such as S.R. 531, Old Tampa Highway, and the S.C.L. Railroad, may not be able to resist such a large flood since the flow velocity under these bridges is much greater than a permissible velocity of 2.5 ft. per second (Table 2 Appendix A). The mean velocity in the floodway areas would not generally exceed 2.5 ft. per second; however, the mean velocity in the main channel slightly exceeded 2.5 ft/sec. in the reach near Oak Ridge Bridge (i.e. Station 1207+20 through 1231+20).

(b) Flood hazard area and encroachment line:

The outline station of the flood stage along Shingle Creek and the encroachment station on every x-section are available from the computer output. They were plotted on the U. S. C. & G. S. Quadrangle sheets on which the location of each cross-section was plotted. With the aid of contours these points were linked together. The elevations from the cross-sections were also used to provide better results. However, a field trip was taken to assist in the process of delineation of the encroachment line at the following locations (where information wasn't available on either the contour maps or the x-sections). These locations are: (a) the area near Lake Tohopekaliga, (b) the swampy area North of S.C.L. Railroad and west of the Kissimmee Airport, (c) the swampy area south of Taft Vineland Road, (d) the urban area along the existing canal from Lake Clear to Shingle Creek. The field trip provided good information for the delineation process for these areas. (The Reedy Creek Swamp area is excluded in this study).

The outline limit of the flood plain area is approximately the same as the flood hazard area shown by RS&H except in the following locations:

(1) Area near the Oak Ridge bridge where a portion of the currently developed area would be within the flood plain, particularly the area east of Shingle Creek.

(2) Area east of Interstate 4 bridge crossing

(3) Area near WLOF Radio Towers. This may be caused by different assumptions in the extension of cross-sections.

Generally, speaking, the encroachment line falls within the 100 year flood hazard areas as shown on Figures 7 through 12. The portion between the encroachment lines along both sides of the main channel is called the designated floodway. This is the channel of the water course. That portion of the adjoining flood plain between the designated floodway and the natural outline of the selected flood is referred to as the floodway fringe. This portion of land can be considered for development either by filling to a required elevation or by applying other flood proofing measures. As a result of delineation of the encroachment line a substantial floodway fringe is available. The residential areas which were developed prior to 1970 and which are currently inside the

100 year hazard area are mostly in this floodway fringe or outside the designated floodway limits. An updated land use map will assist in providing detailed information about the total acreage of developed area already within the designated floodway.

B. Results from Phase II Study.

(a) Storage-Discharge Relationship

The relationship was developed from a multiple run of surface profiles through the HEC-2 program. The discharges used were 500, 1000, 1500, 2000, 3000, up to 9000 cfs with different initial stages such as 54.0, 55.0, 56.0 and 57.5 ft. m.s.l. at Lake Tohopekaliga. It was found later that the backwater stages for different initial stages of the same discharge were about the same. However, the various discharges were tested to estimate the storages due to variable backwater effects, channel storage, and local inflows, etc. A runoff distribution was first estimated, then a refined storage-discharge relationship was developed through the process described in the general procedures. The results of this relationship are attached in Appendix B. The storage of the swamp area in Reach #10B has been added to the storage-stage relation obtained from the computer output since no survey information was available. Therefore, the computation done by RS&H was used to adjust the storage-stage relationship and storage-discharge relationship.

(b) Design Discharge Distribution

The above storage-discharge relation for each reach was used in the developed flood routing program which also combined the developed design flood hydrograph from each subdrainage basin provided by RS&H. The detail computations for each reach are attached in Appendix C. The peak discharge was selected as the design discharge distribution for the backwater computation. Table 1 shows the peak discharges of the project design hydrographs at every reach; time of peak is also presented in the same table. The results of peak discharge and time of peaks are not much different from the results obtained by RS&h for the lower reaches (Reach #7 through #16). However, a slightly higher discharge of about 300 to 500 cfs resulted from the reaches with channel improvement (i.e. the channelized portion) as compared to the RS&H result. There is no significant difference in time to peak; generally they agree within approximately an hour with few exceptions.

(c) Flood Profiles:

The maximum water surface elevation was determined by computing water surface curves using the computed peak discharge in each reach. This provided a more conservative backwater surface profile. The peak discharges used in this study are comparably higher than those used by RS&H. However, the resulting flood profile for the lower reaches is about the same. The flood profiles resulting from the Phase II study are shown on Figures 13 through 17. The peak discharge in each reach which produced this flood profile, the existing river bottom, and the design channel bottom elevation are also shown on the same plot.

The profile for the design channel portion is comparably much lower than the natural profile (Phase I Study), particularly in the reach between Oak Ridge and Interstate 4. The profile for the reach between Orlando Vineland and the upper end is about 1.9 ft. lower than the natural profile. However, there is a two foot drop of stage through the bridge crossing at Orlando Vineland Road. This backwater resulted from the restriction of an inadequate bridge opening at this location. The assumption of two feet of excavation under the existing bridge section may not be a good assumption.

The mean velocity in the main channel is also shown at each section. The velocity near most bridge sections slightly exceeds 2.5 ft/sec. except station 1231+20 which is 3.69 ft/sec. as compared to 5.7 ft/sec. with the natural channel. Since the design section was based on a once in 10 year frequency, the velocity under the 100 year frequency exceeded the permissible velocity for the channel. The velocities in the overbank areas are much less than 2.5 ft. per second.

(d) Delineation of Flood Areas:

The outline limit of the flood area was determined in the same way as described previously. The flooded areas for the lower reaches are approximately the same as in the Phase I Study. The results of this delineation are shown on Figures 7 through 12; the same maps used in the Phase I Study. Generally, the outline limit falls within the encroachment line that resulted from the Phase I Study for reaches north of the Florida Turnpike. A substantial portion of the floodplain will be outside the floodway limit. The floodway will be generally confined within 100 feet either side of the main channel for the reach between Orlando Vineland Road and Oak Ridge Road. The lower land areas of the reach between Orlando Vineland Road and Section 39 (Station 1445+00) will be flooded due to the backwater effect that results from the restriction of the Orlando Vineland Road Bridge. The flood stage will be confined within the design channel for the rest of the two upper reaches which are already urbanized. However, the depth of the flood is considerably less than that which resulted under natural channel conditions. The flooded area could be reduced by increasing the flow cross-section under the Orlando Vineland Bridge.

Conclusions and Suggestions:

Generally, there are two approaches in flood plain management; one is through the enactment of flood plain regulations; the other is by providing flood control works. The studies presented in this text are directed toward these two approaches to provide in-depth information on flood stage and flood hazard areas, and to evaluate the feasibility of flood control works by considering channelization of Shingle Creek north of the Florida Turnpike.

As mentioned previously, the flood hazard area was assumed to be the flood plain along the main channel of Shingle Creek inundated by the 100 year frequency design storm under existing committed land use. This 100 year flood is approximately equal to the Corps of Engineers Intermediate Regional Flood.

The results of this study can be summarized as follows:

1. The flood profiles for the 100-year storm under natural channel conditions generally agrees with the results computed by RS&H. The outline limits of the flood hazard area also agree very closely with the RS&H results except for the three locations identified in the previous sections. Taking a conservative approach, the maximum outer limits of both studies were used to establish the outline limit of the 100-year flood hazard area. The actual limit of the flood hazard area on the ground may vary somewhat from that shown on Figures 7 through 12.
2. The encroachment lines in the flood plain area are also presented on Figures 7 through 12. Use of the designated floodway results in a substantial reduction of the flooded area. The developed areas inside the flood hazard zone prior to 1970 are mostly located outside of the designated floodway. However, portions of presently urbanized areas are located within the encroachment line.
3. The flood hazard area for Reedy Creek basin and the area adjacent to the existing canal from Lake Clear to Shingle Creek can be delineated by using the flood stage computed in this study, and the discharge developed by RS&H for the appropriate sub-basin, however, additional cross-sections will be required to define the flooded area.
4. The 100-year flood stage in Lake Tohopekaliga may be slightly higher than 57.5 feet. It is believed that the effect of the increased

stage would be felt only downstream of the S.C.L. Railroad due to the large amount of storage available northwest of S.C.L. Railroad.

5. The designated floodway is very critical. The only type of land use that can be permitted is agricultural, golf course, or other recreational uses that do not require filling. Failure to protect this zone will cause massive flooding upstream.
6. The delineation of the encroachment line on the flood plain area by allowing 0.5 feet rise above 100 year flood profile under the channelized condition is not included in this report. However, the information is available in computer output form.
7. Several areas, such as Lake Mann, Turkey Lake, Westside Manor, etc. did not contribute to the peak flood stages due to a time lag. Therefore the flood hazard area has not been delineated. These areas will be studied individually and a flood hazard area will be delineated. More field work will be required before this work can be done.

The results of the channelization north of Florida Turnpike can be briefly detailed in the following paragraphs:

(1) The peak discharge for the lower reaches (south of the Florida Turnpike) could not be significantly increased with the improved flow conditions in the upper reach. This is probably due to the large amount of storage available in the swampy areas immediately downstream of Taft Vineland Road.

(2) The flood stages and flood hazard areas in the lower reaches would not be changed as a result of improvement in flow conditions north of the Florida Turnpike.

(3) The flood stages and flooded areas in the channelized reach would be greatly reduced in depth and area.

(4) The flood areas in the channelized reach would fall within the encroachment line that results by allowing a 0.5 feet rise of water surface elevation above the 100 year natural flood profile.

(5) The assumpiton of 2 feet of excavation for a design channel under the Orlando Vineland Bridge is not adequate, since approximately two feet of backwater would result north of the bridge crossing due to restriction of flow by that bridge opening. Therefore, the design channel section used in this study can be improved, and the flood stages north of Orlando Vineland Road can be lowered if the design section under the existing bridge is improved.

(6) In addition to the Orlando Vineland Bridge, improvement to the following bridges should be investigated in the formation of a flood plain management plan.

(a) S.R. 600--the present section is inadequate for the flow generated by the 1-10 year storm proposed in the Corps of Engineers' "Survey Review Study for Shingle Creek". The bridge has adequate length, but the substructure needs investigation.

(b) S.R. 531 is an old concrete bridge with a restricted opening. It may possibly fail if there is a large build-up of debris during the flood.

(c) The Old Tampa Highway bridge will probably fail as it did 1960.

(d) The Conroy Road bridge is a new concrete bridge. The high velocities can be controlled by use of rip-rap.

(e) There are other bridges that will be submerged under the 100 year flood. It will be necessary to investigate their structural stability.

Table 1. Peak Discharges of Project Design Hydrographs

Ranch No.	Peak Discharges of Project Design Hydrographs @Head (cfs)	@Foot (cfs)	Time of Peak @Head (Hours)	@Foot (Hours)
1	650	450	10.0	11.5
2A	3580	2230	10.5	12.5
2B	2230	1910	12.5	15.5
3	2720	2340	10.0	13.0
4	2550	2550	12.0	11.5
5A	3720	3710	11.5	11.5
5B	3800	3720	11.5	12.5
6A	5330	5200	11.0	12.0
6B	6930	5340	11.5	14.5
7	6160	5490	14.0	16.5
8A	6440	6390	15.0	16.0
8B	6390	6180	16.0	18.0
9	7140	7630	16.5	17.5
10A	7630	7610	17.0	17.5
10B	8700	5950	16.0	24.5
11	6100	5590	24.0	28.5
12	5800	5630	26.5	30.0
13	5640	5580	30.0	31.5
14	5590	5420	31.5	35
15	7550	7450	15.5	17.5
16	7750	7530	16.0	19.0

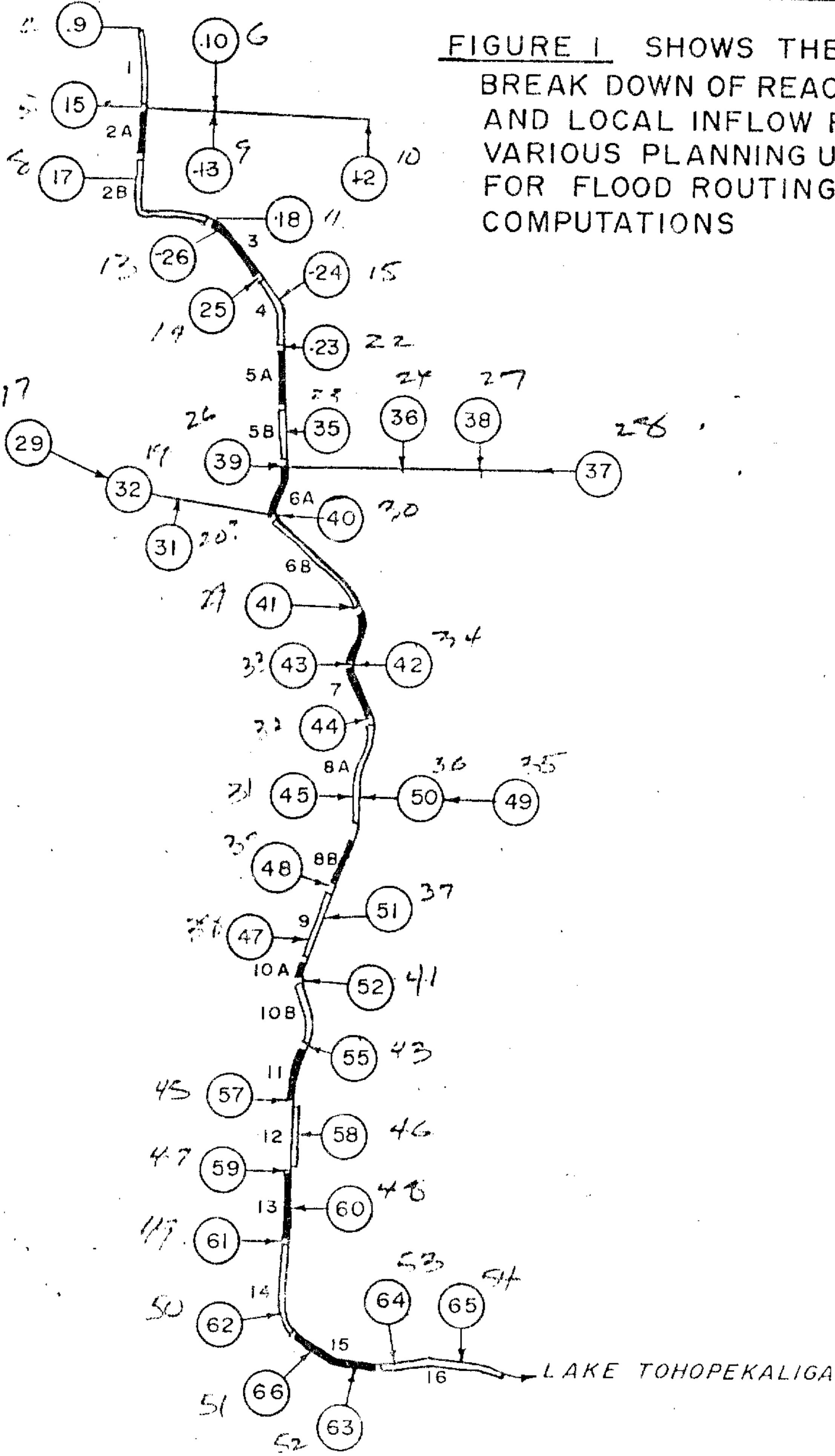


FIGURE 1 SHOWS THE BREAK DOWN OF REACHES AND LOCAL INFLOW FROM VARIOUS PLANNING UNITS FOR FLOOD ROUTING COMPUTATIONS

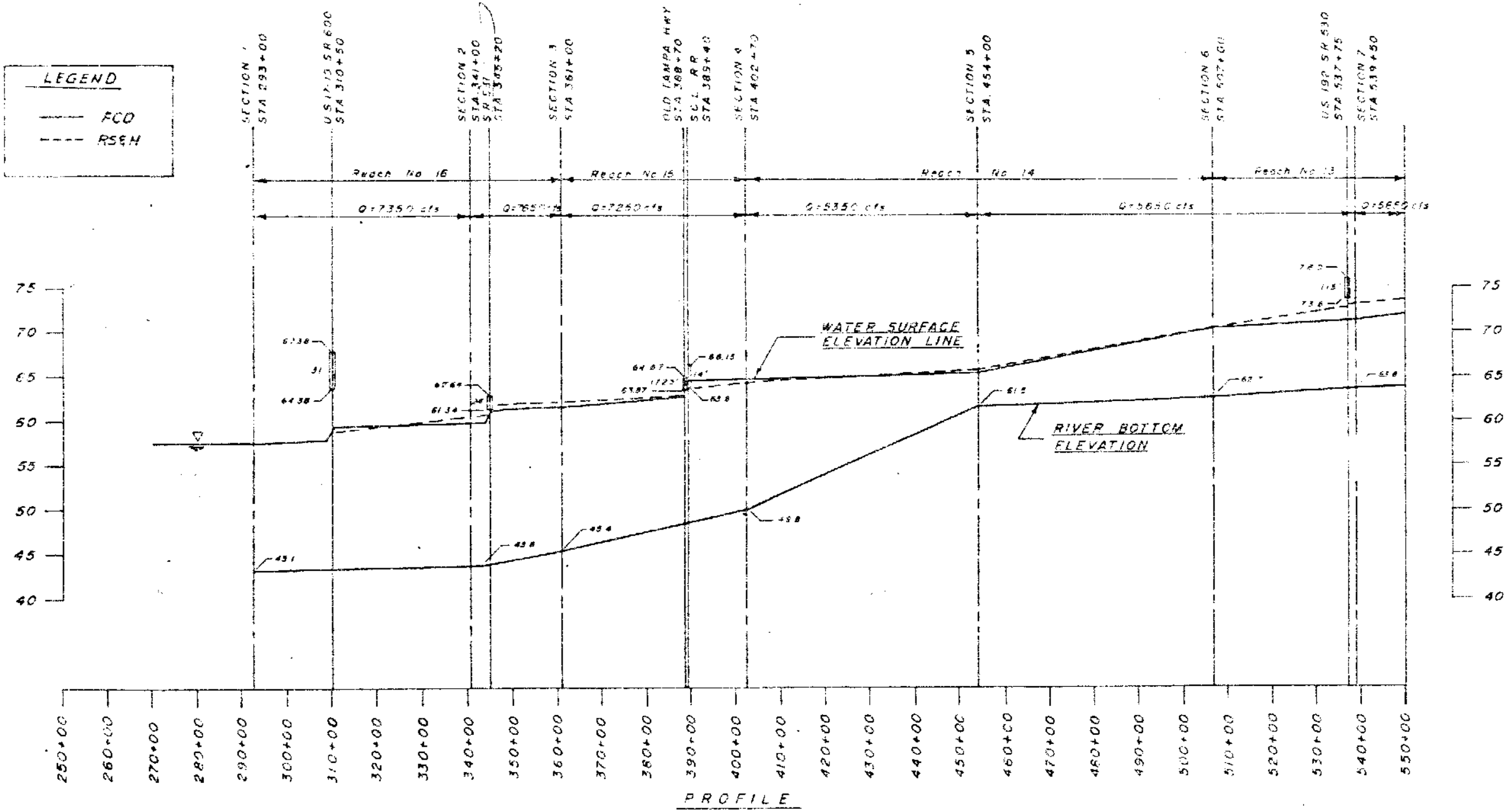
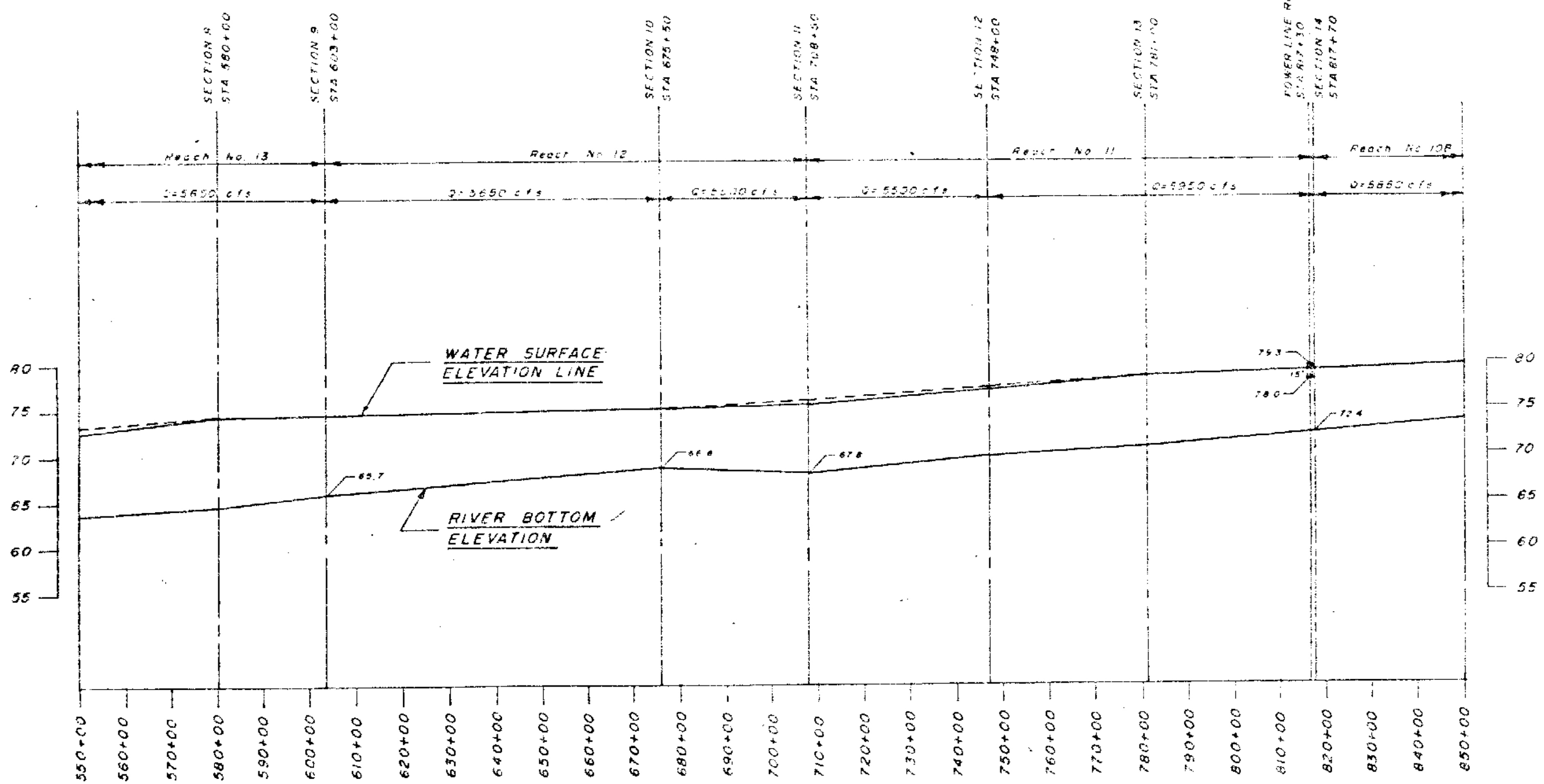


FIGURE 2

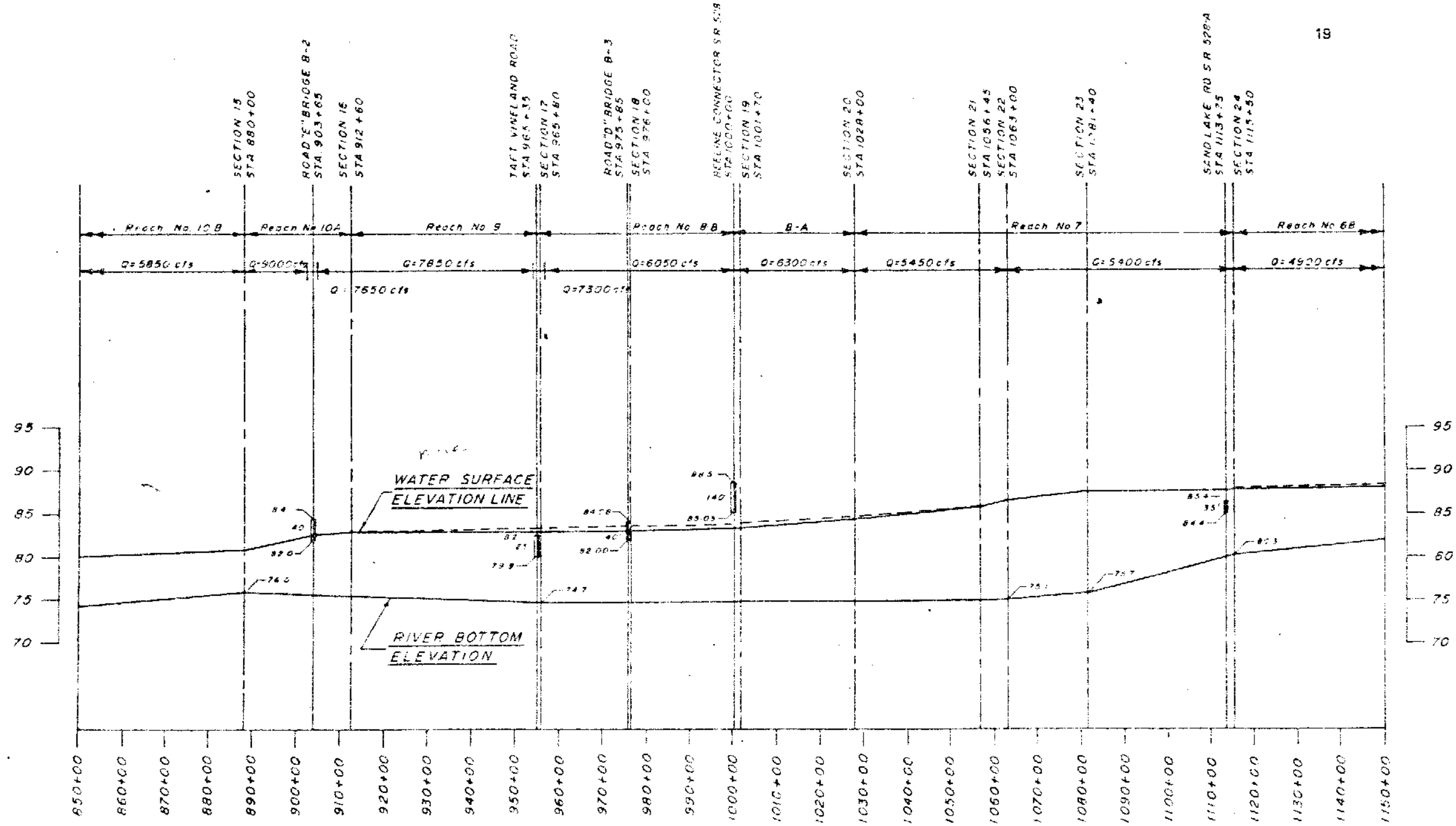
WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, STA. 250 TO STA. 550



PROFILE

WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, STA 550 TO STA 850

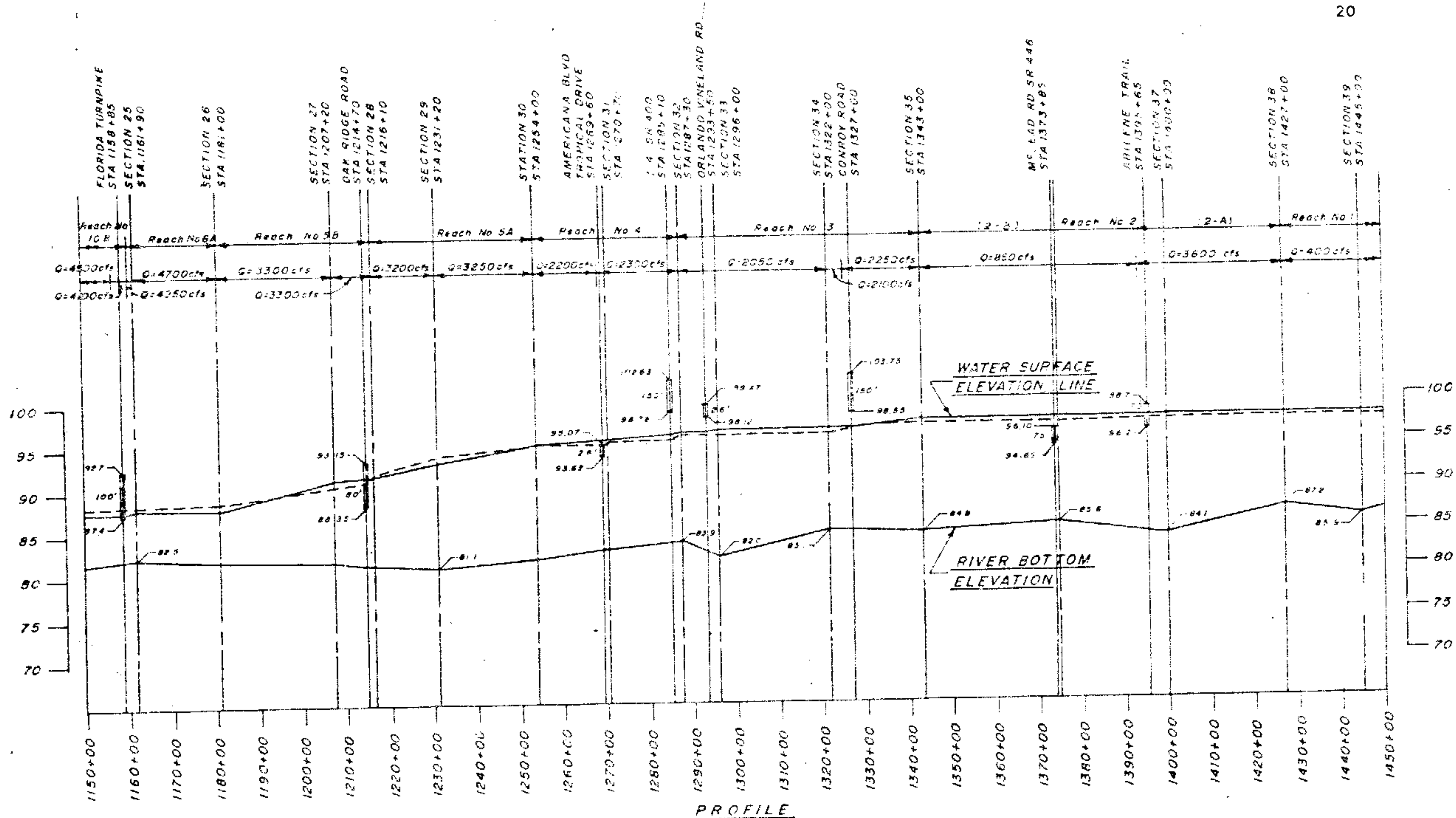
FIGURE 3



PROFILE

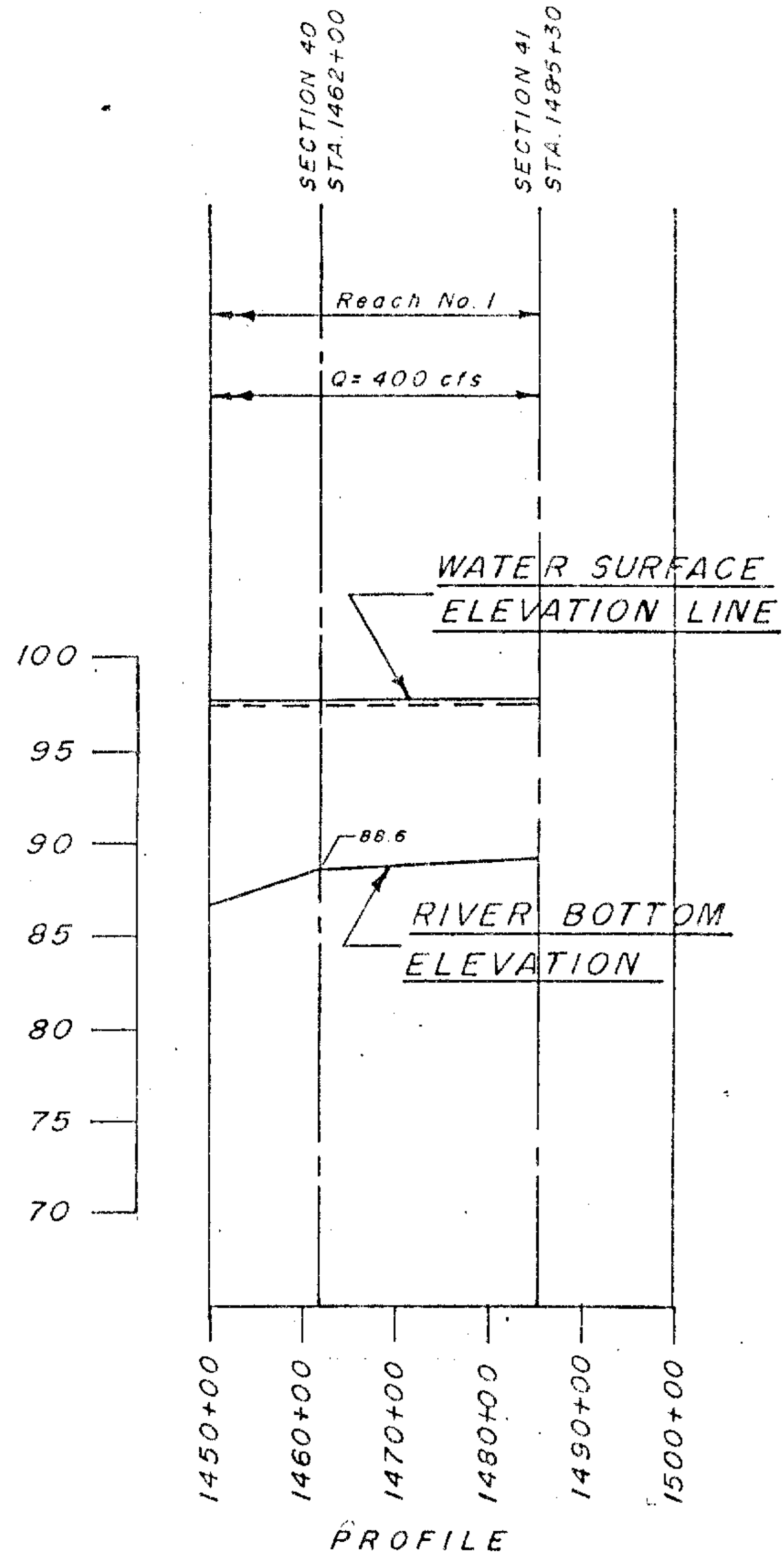
WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, STA 850 TO STA 1150

FIGURE 4



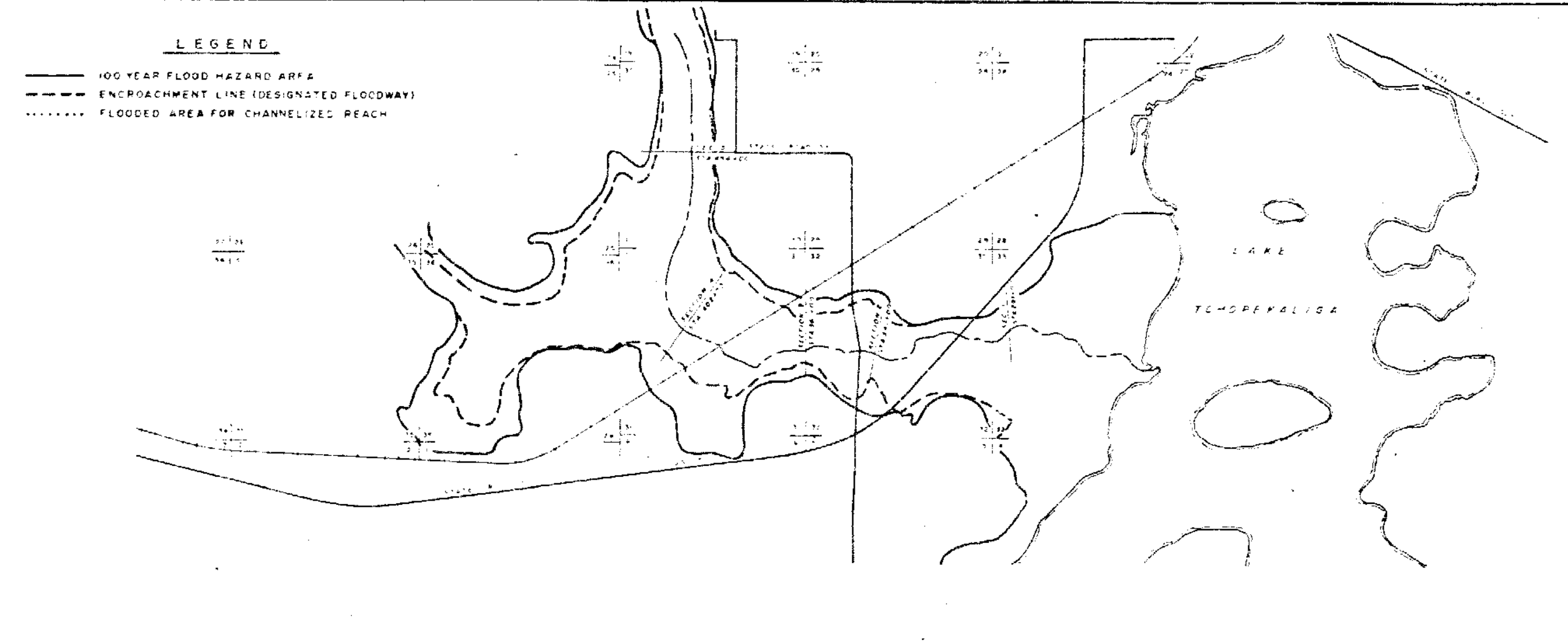
WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, STA 1150 TO STA 1450

FIGURE 5



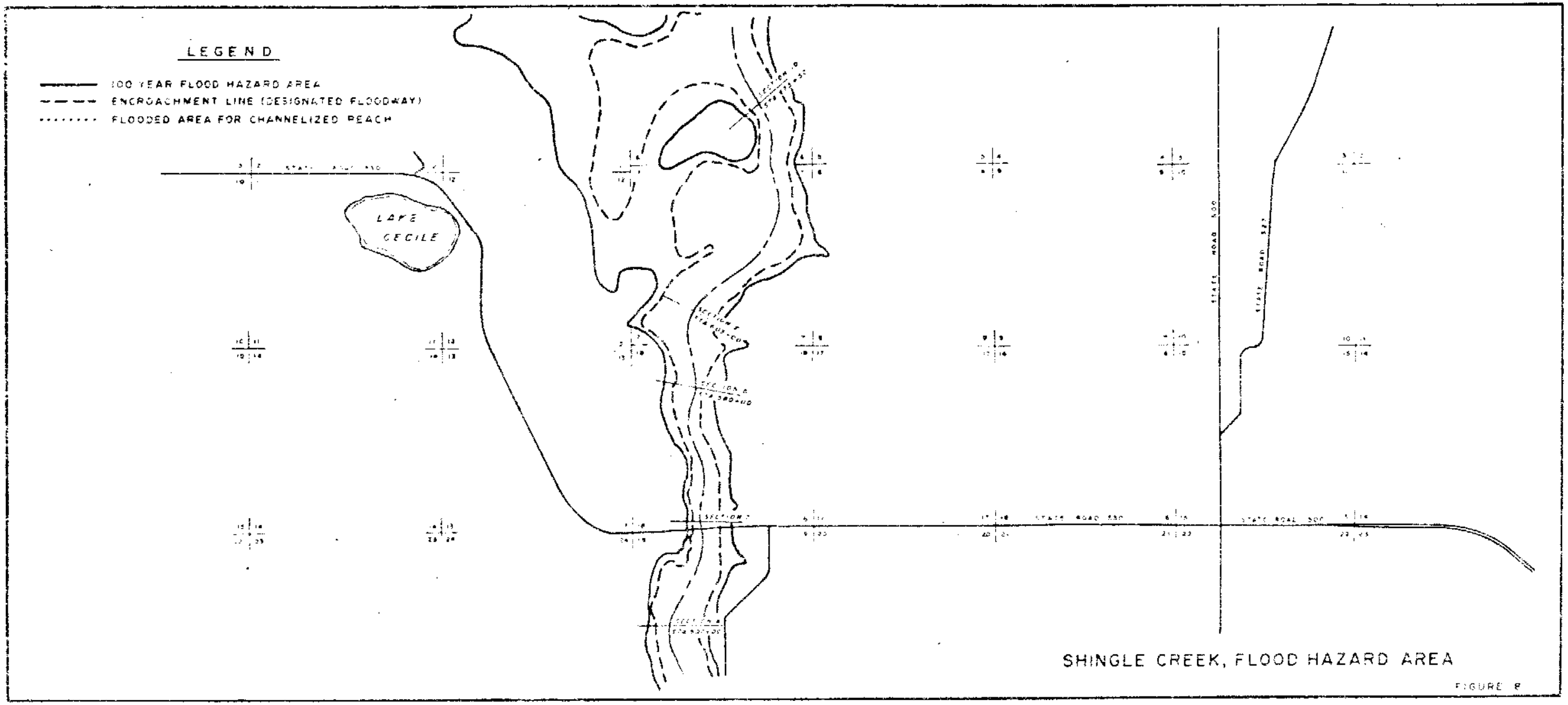
WATER SURFACE ELEVATION LINE,
100 YEAR FLOOD, STA. 1450 TO STA. 1500

FIGURE 6



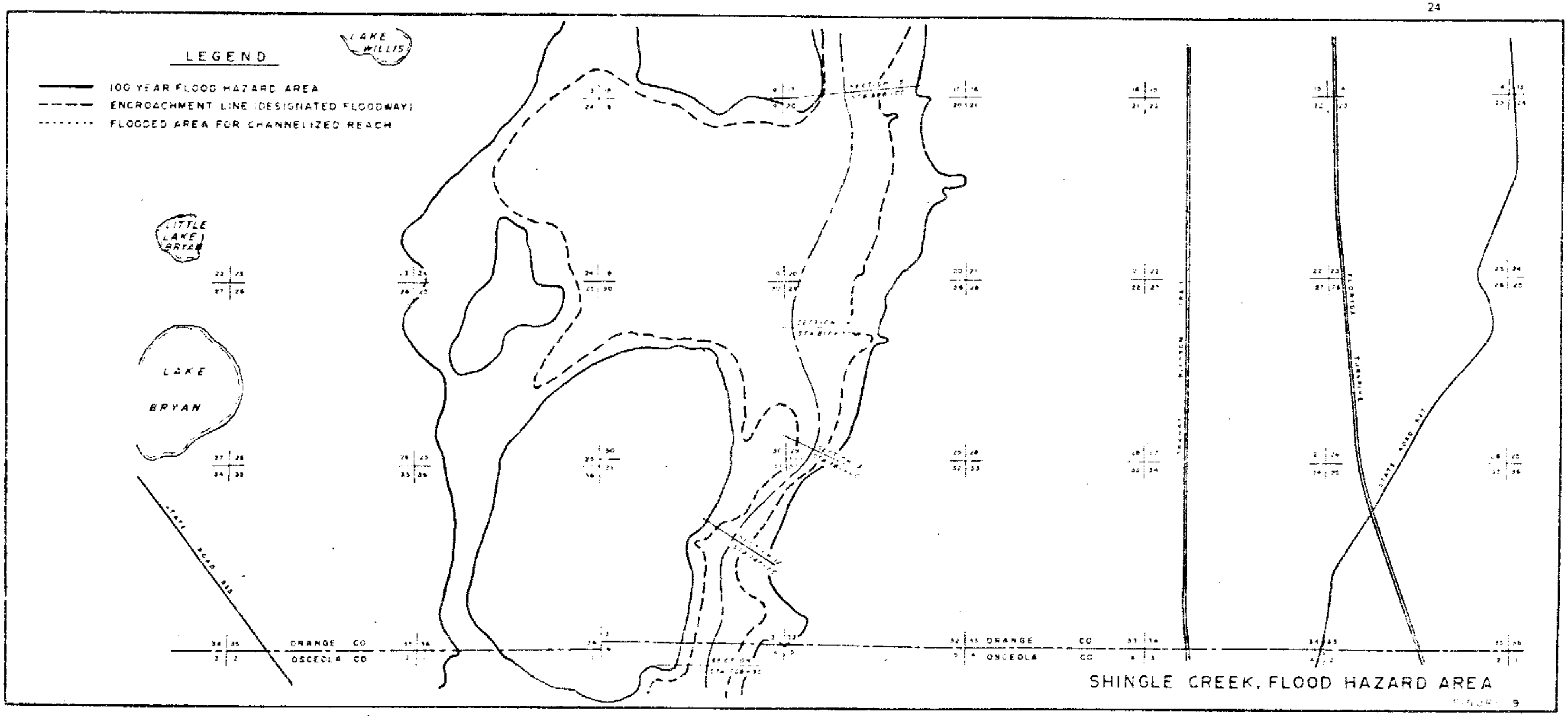
SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE 7



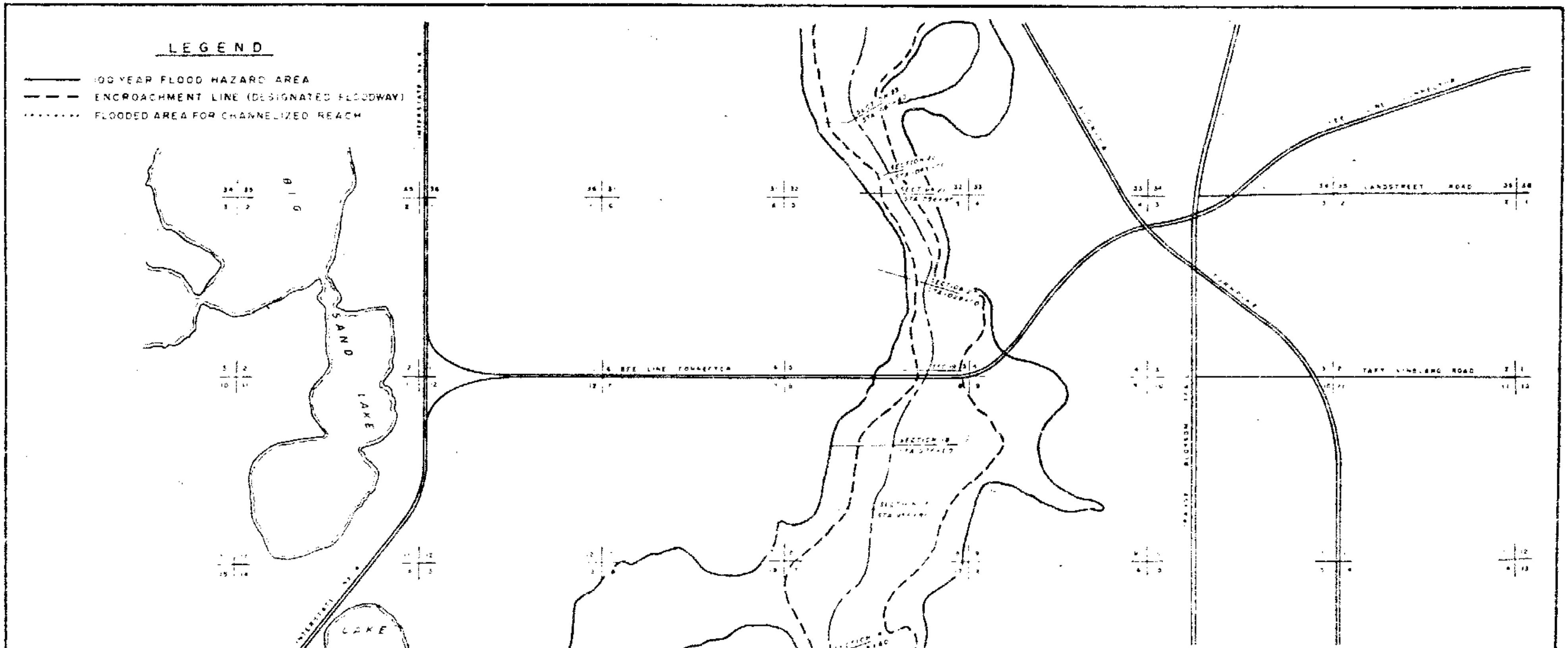
SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE 8



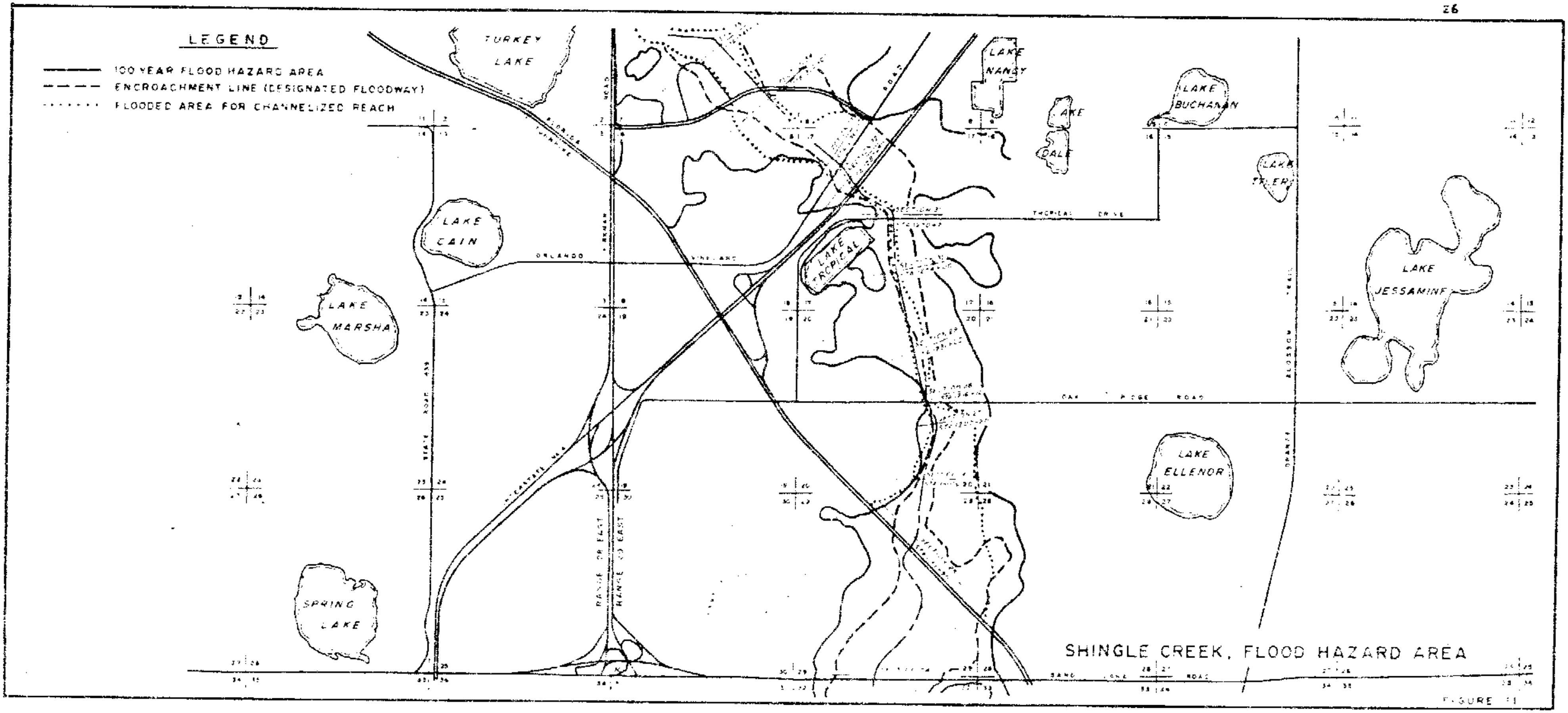
SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE 9



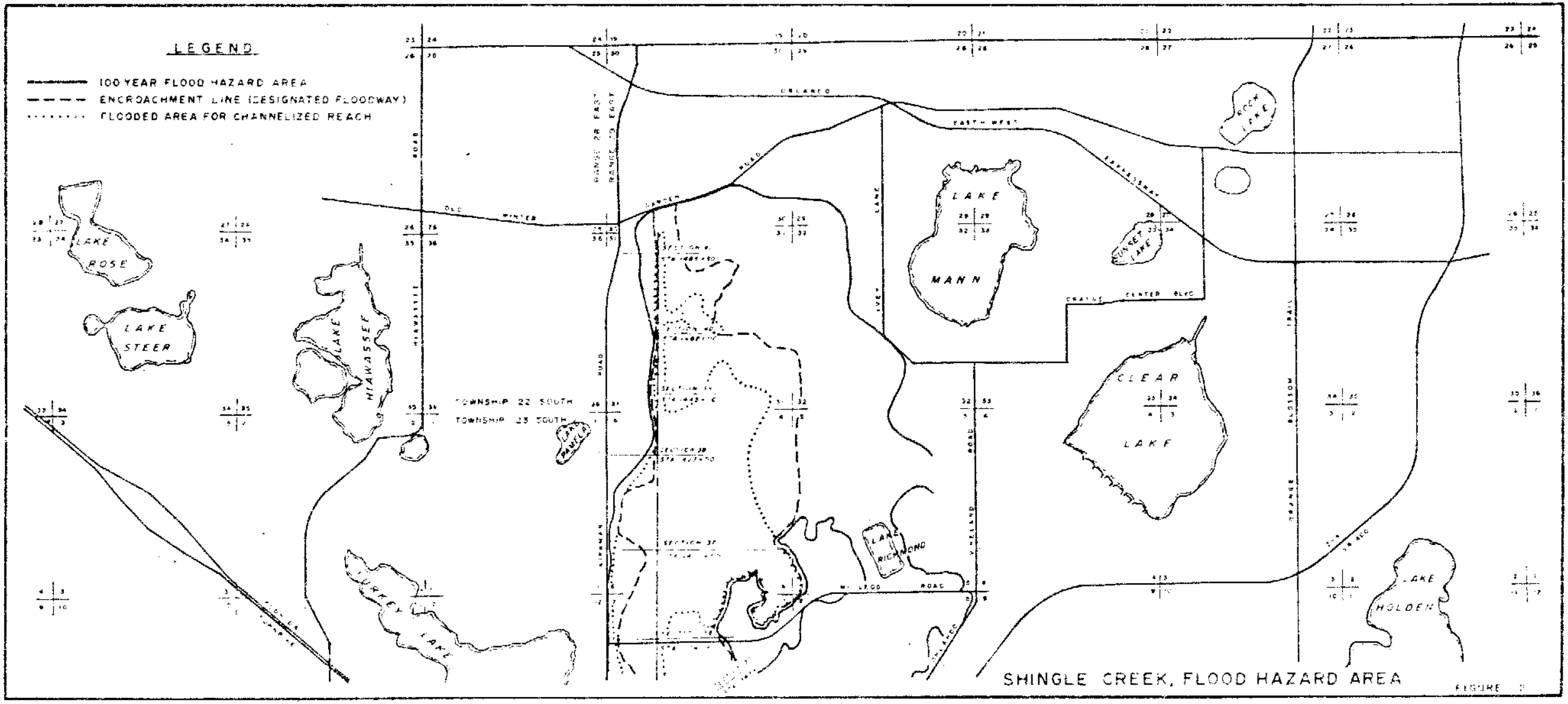
SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE 10



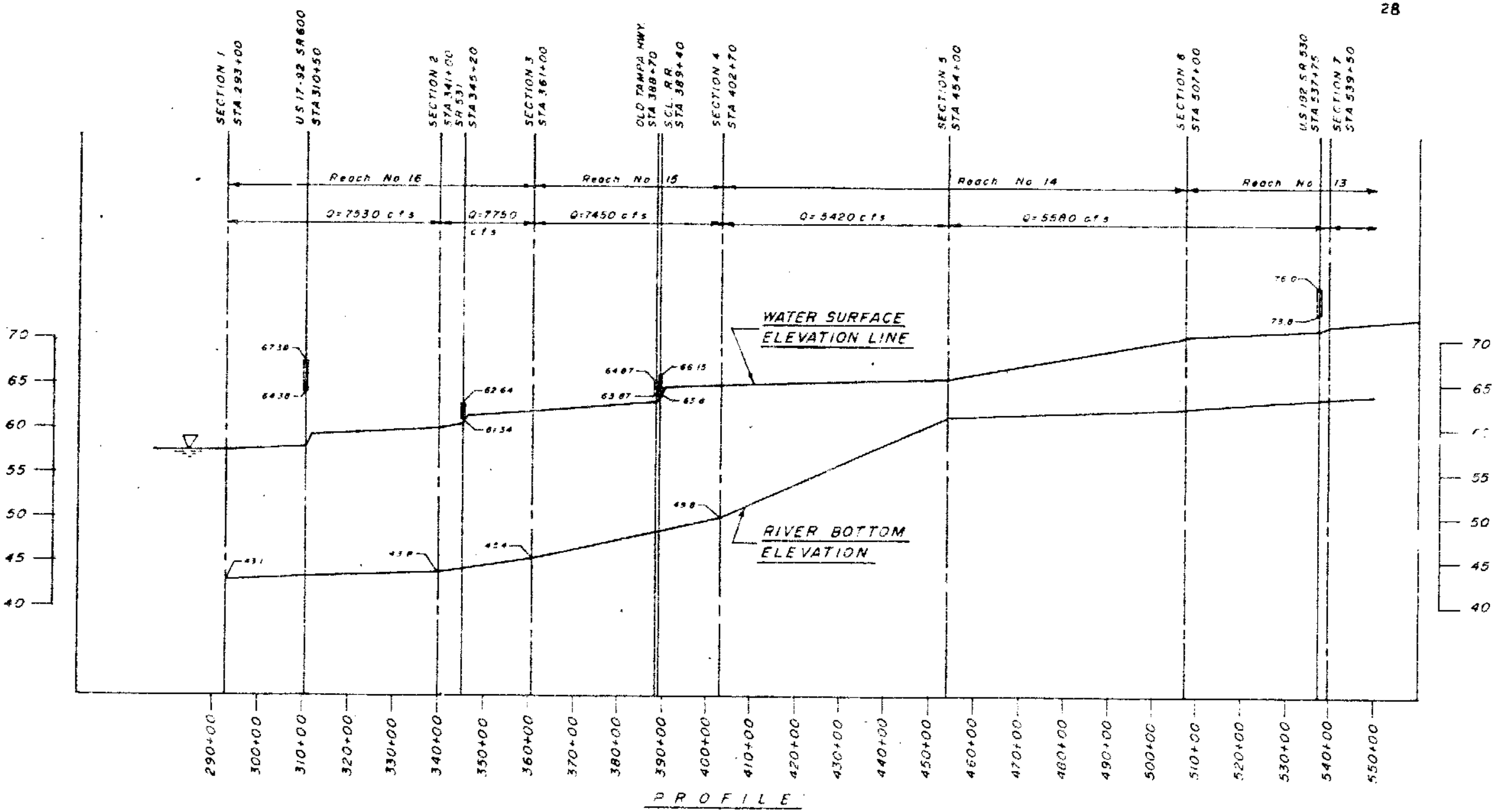
SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE 11



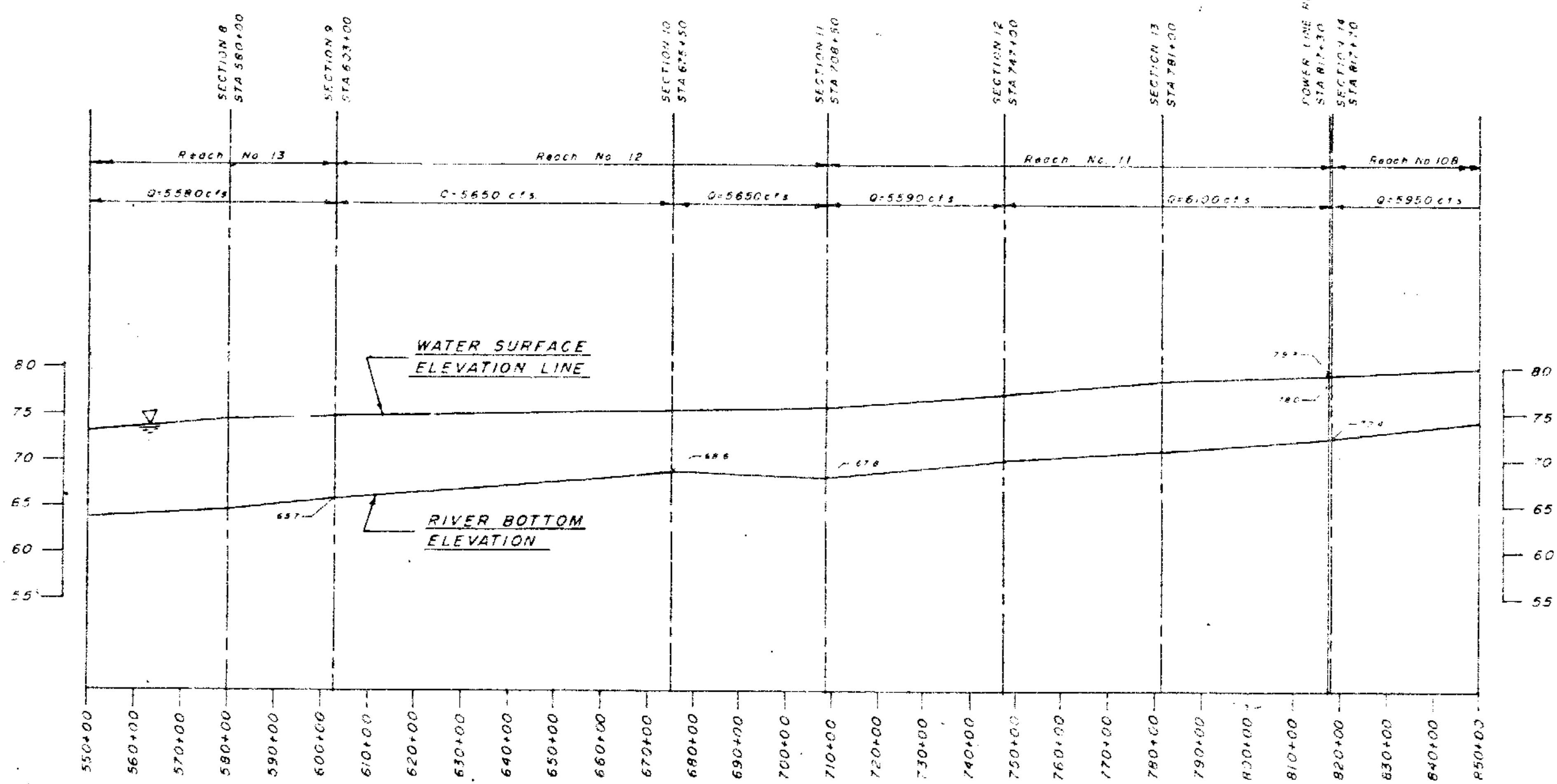
SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE



WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, (WITH CHANNELIZATION NORTH OF TURNPIKE)
STA. 290 TO STA. 550

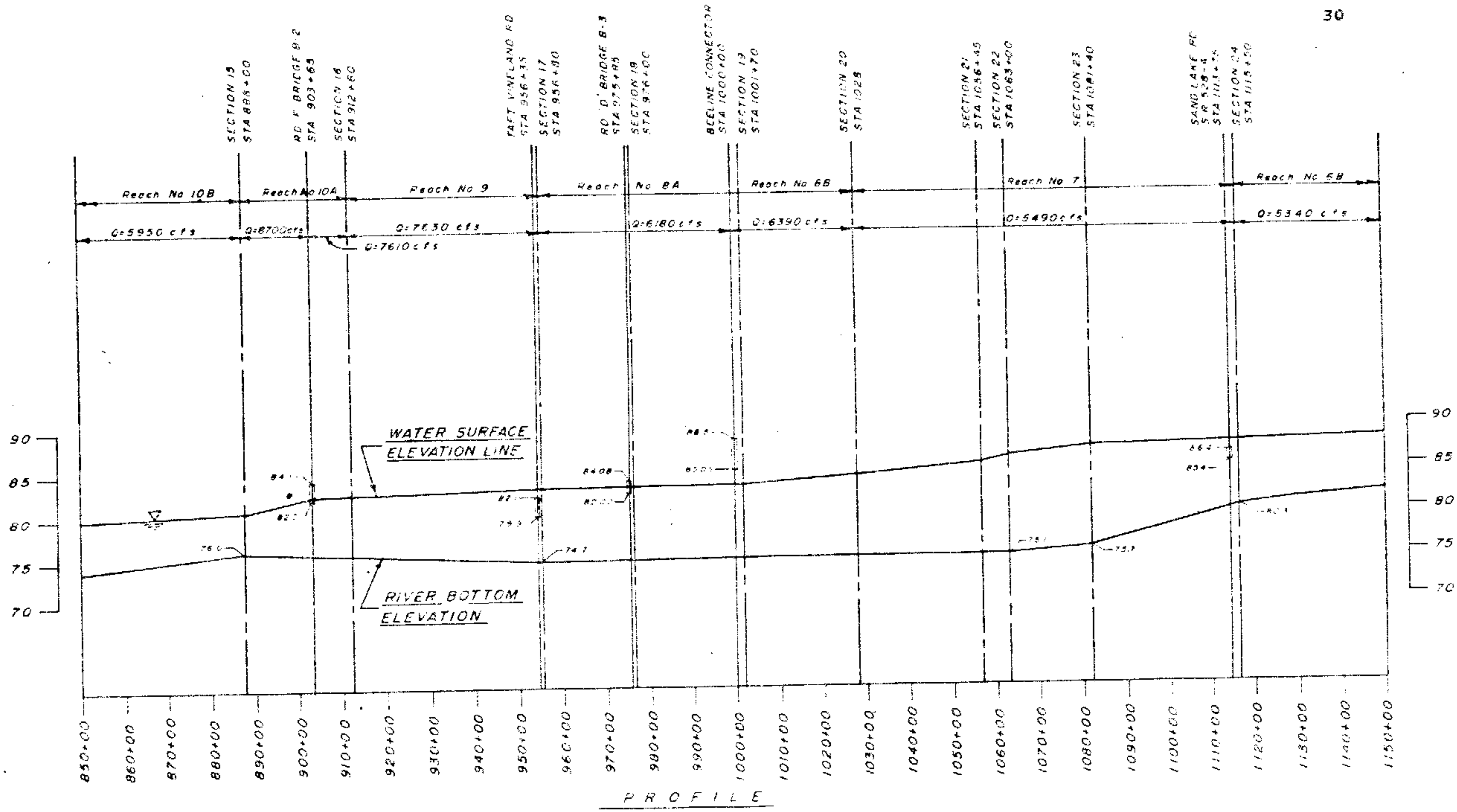
FIGURE 13



PROFILE

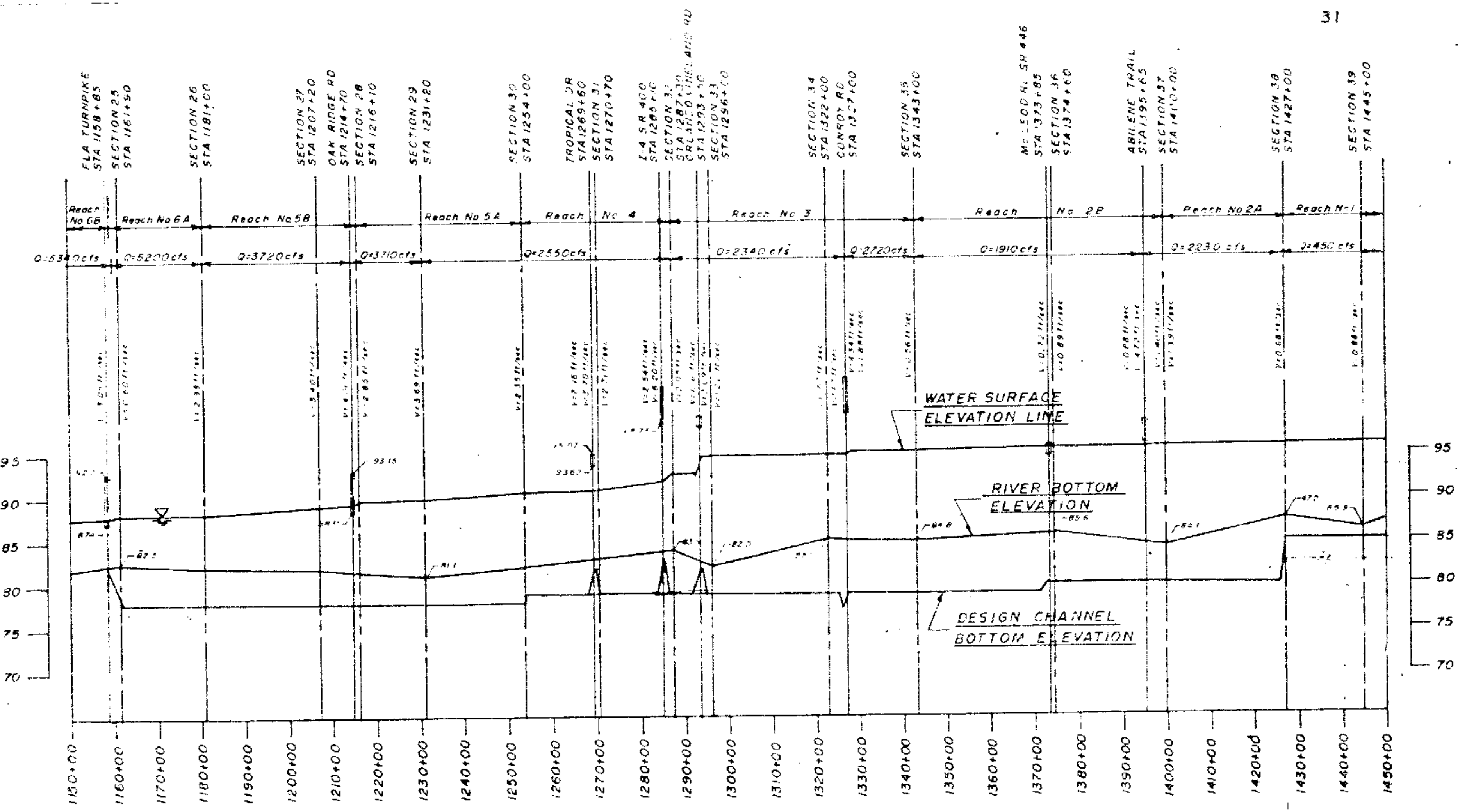
WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, (WITH CHANNELIZATION NORTH OF TURNPIKE)
STA. 550 TO STA. 850

FIGURE 14



WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, (WITH CHANNELIZATION NORTH OF TURNPIKE)
STA. 850 TO STA. 1150

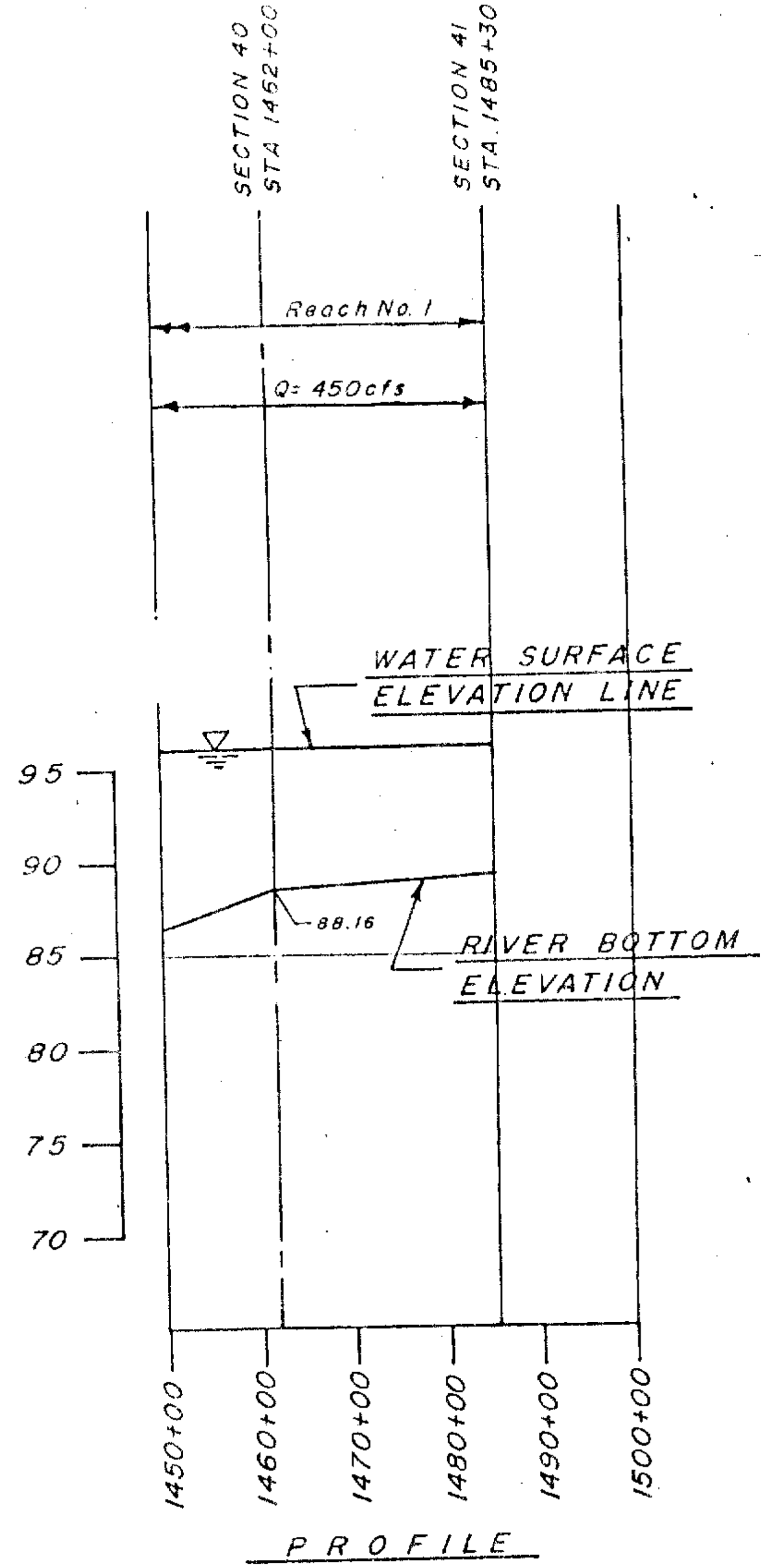
FIGURE 15



PROFILE

WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, (WITH CHANNELIZATION NORTH OF TURNPIKE)
STA 1150 TO STA. 1450

FIGURE 16



WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, (WITH CHANNELIZATION NORTH OF TURNPIKE) STA. 1450 TO STA. 1500

FIGURE 17

APPENDIX A

Table 1: Design Section

Table 2: Mean Velocity Through Bridges Under Natural Conditions

Table 1. The Channelization of Upper Shingle Creek

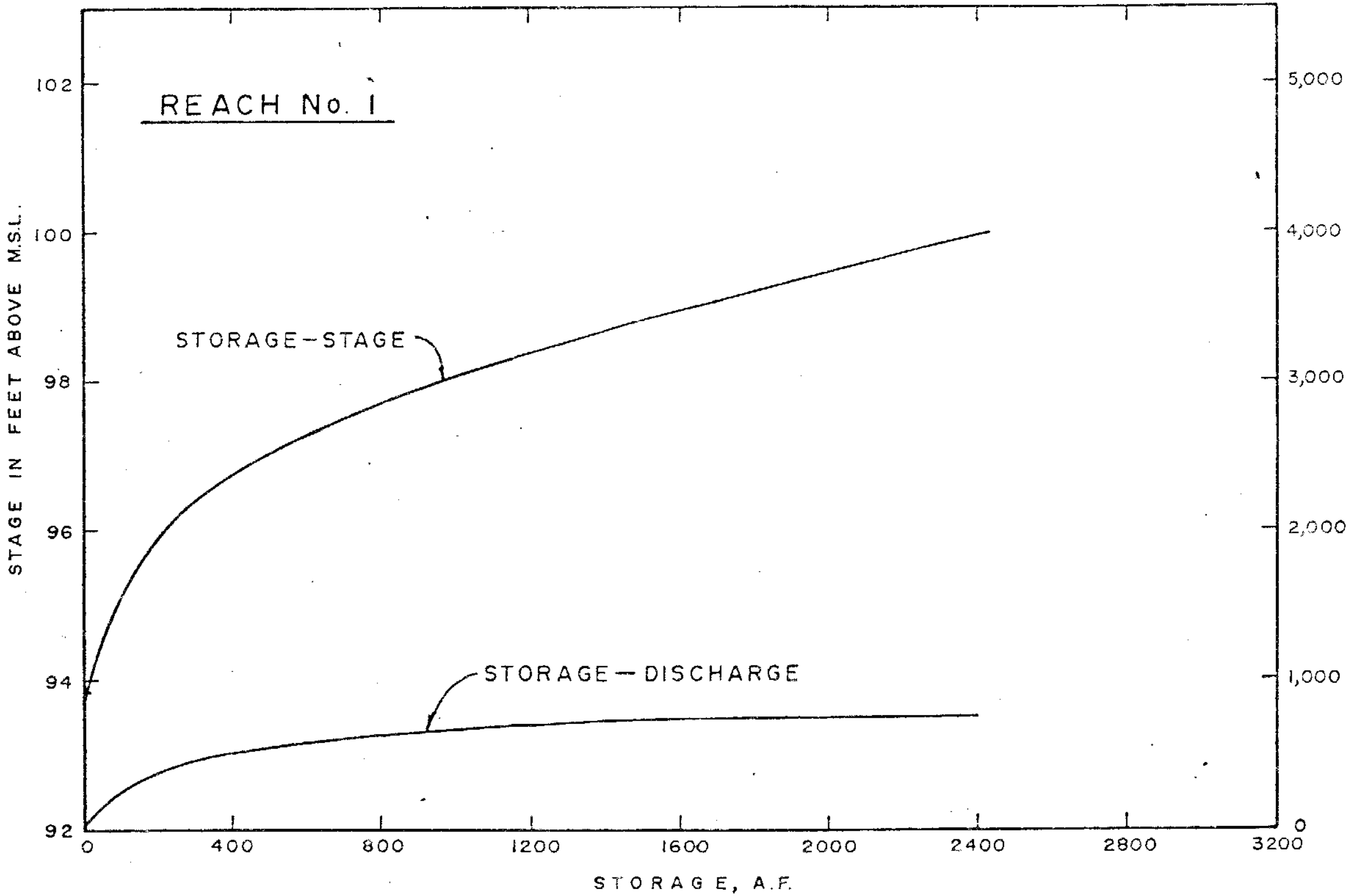
Station	Location	Qcfs	BWFt.	B.Ele.
1158+85	Near turnpike		70	78
1231+00			70	78
1254+00			70	79
1268+00	Near Americana Blvd Tropical Drive		70	79
1269+60	Tropical Drive		55	79
1358+00	Turkey Point inflow		50	80
1360+00	"		50	80
1410+00	Clear Lake inflow		30	80
1427+00			20	85
1485+00			20	85
East to Lake Clear				
1410+00			30	80
1412+00			30	80
1520+00			30	85

Table 2. The mean velocity through highway bridges crossing Shingle Creek under natural channel conditions

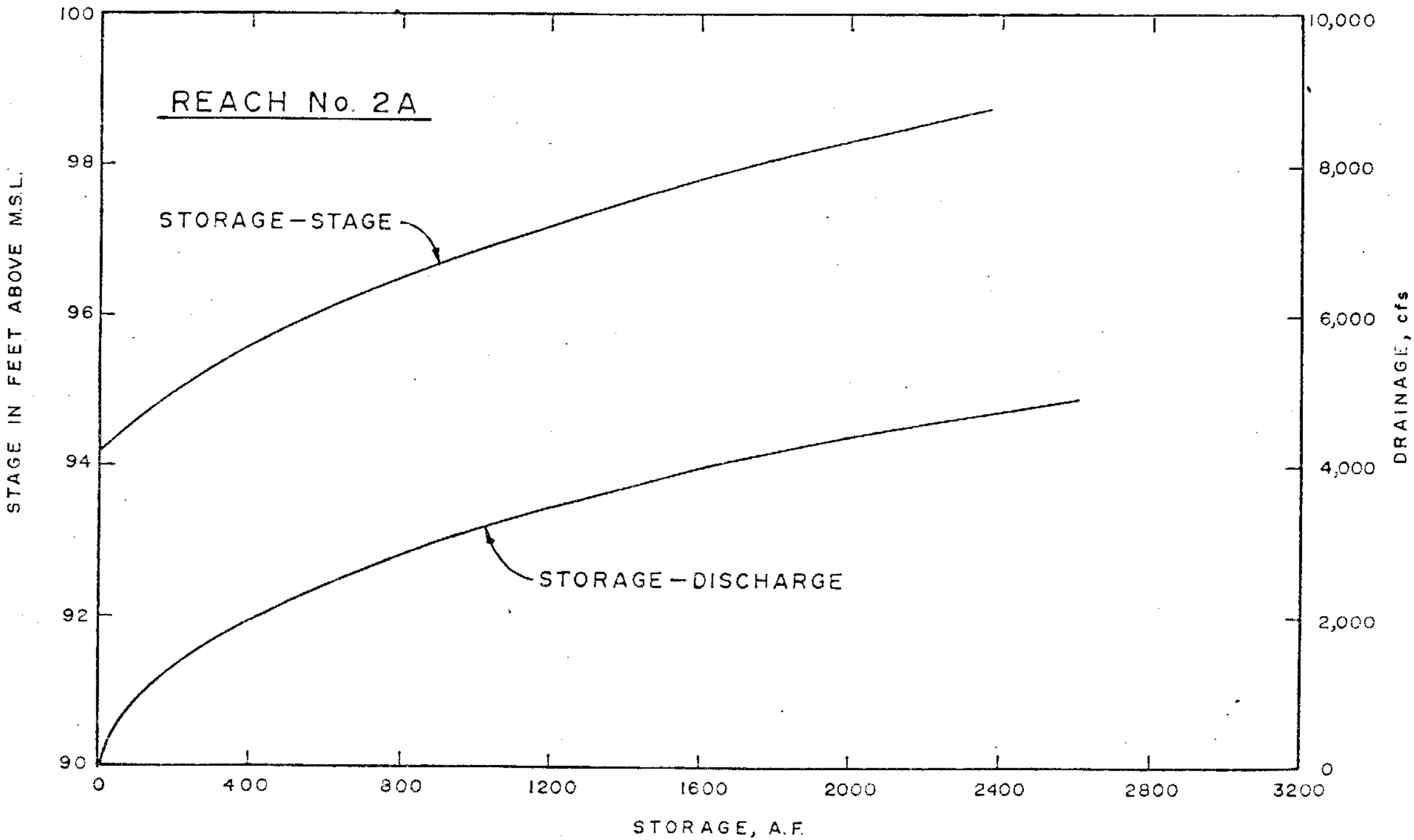
Bridge	Velocity, ft/sec.
U.S. 17-19 (S.R. 600)	5.20
S.R. 531	10.09
Old Tampa	8.23
S.C.L. Railroad	2.80
U.S. 192 (S.R. 530)	1.02
Road "E" Bridge (B-2)	1.52
Taft Vineland Road	0.80
Road "D" Bridge (B-3)	1.10
Beeline Connector (S.R. 528)	2.18
Sand Lake Road (S.R. 528-A)	0.44
Florida Turnpike	2.86
Oak Ridge Road	2.99
Americana Blvd. Tropical Dr.	1.56
I-4 (S.R. 400)	3.81
Orlando Vineland Rd.	2.32
Conroy Road	5.33
Mcleod Road (S.R. 446)	0.20
Abilene Trail	3.29

APPENDIX B

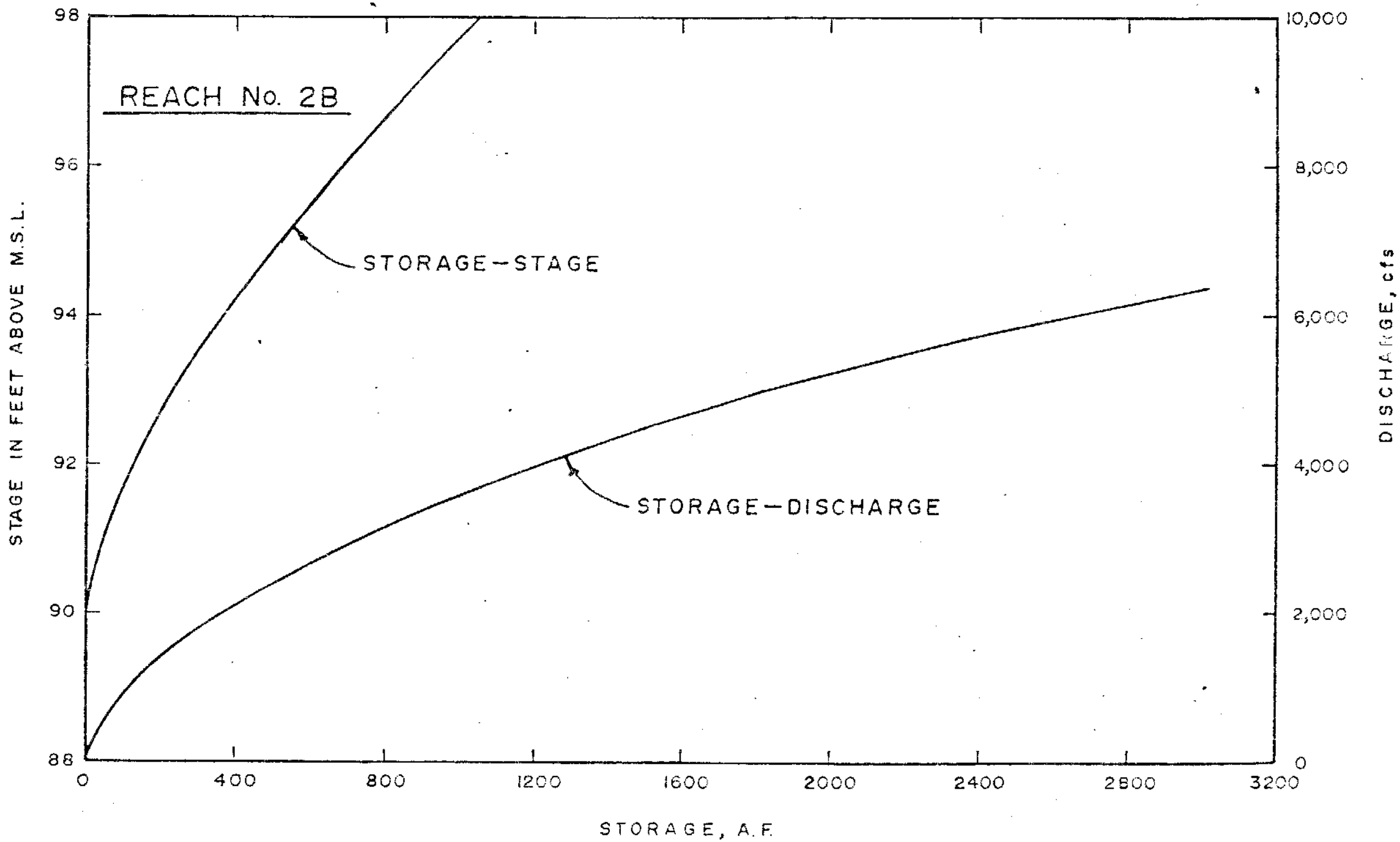
Relationships for Storage, Stages and Discharges

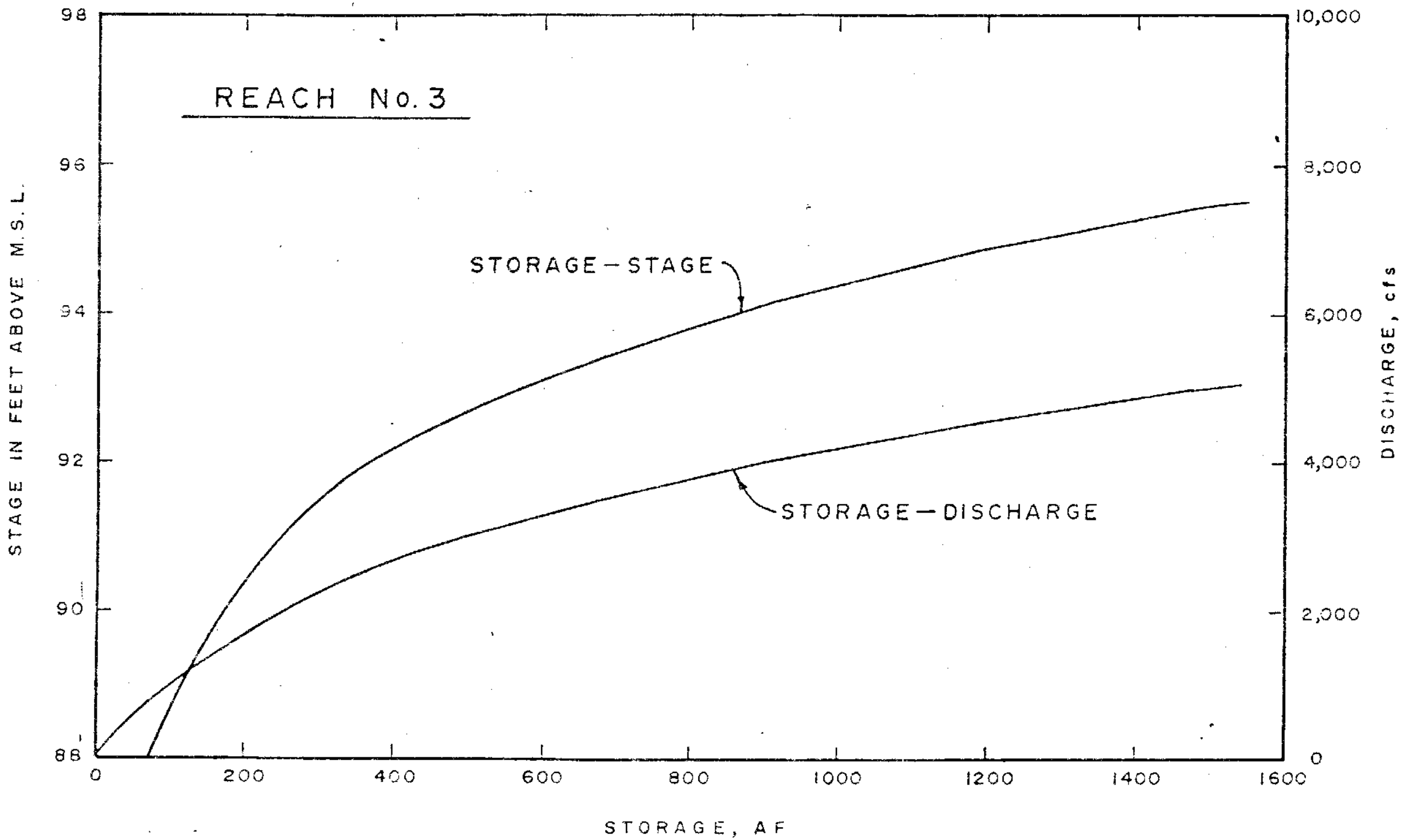

REACH No. 1
STORAGE-STAGE
STORAGE—DISCHARGE
STAGE IN FEET ABOVE M.S.L.
92
94
96
98
100
102
DRAINAGE, cfs
0
1,000
2,000
3,000
4,000
5,000
STORAGE, A.F.
0
400
800
1200
1600
2000
2400
2800
3200

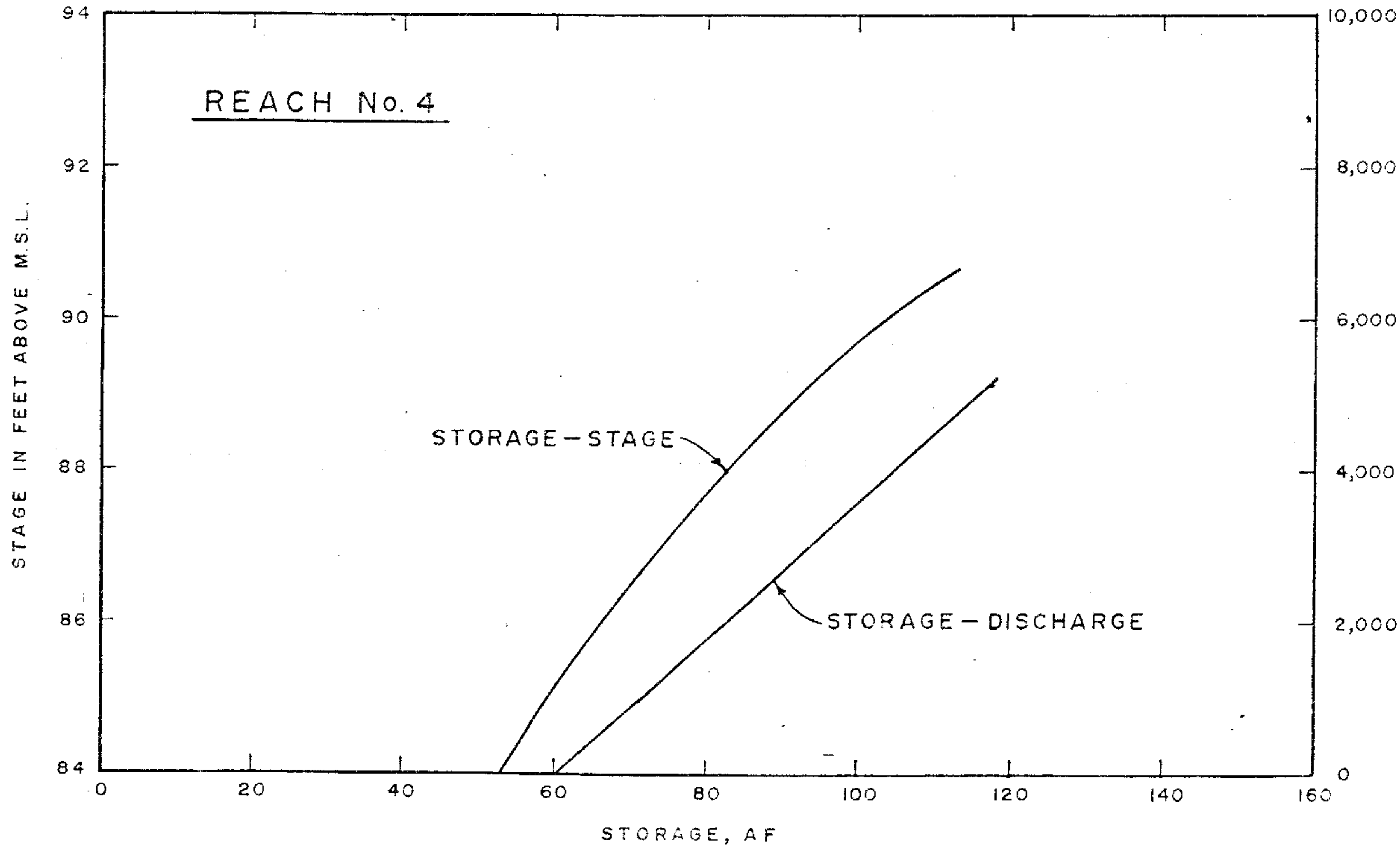
2 B


REACH No. 2A
STORAGE – STAGE
STORAGE – DISCHARGE
STAGE IN FEET ABOVE M.S.L.
DRAINAGE, cfs
STORAGE, A.F.
90
92
94
96
98
100
0
2,000
4,000
6,000
8,000
10,000
0
400
800
1200
1600
2000
2400
2800
3200

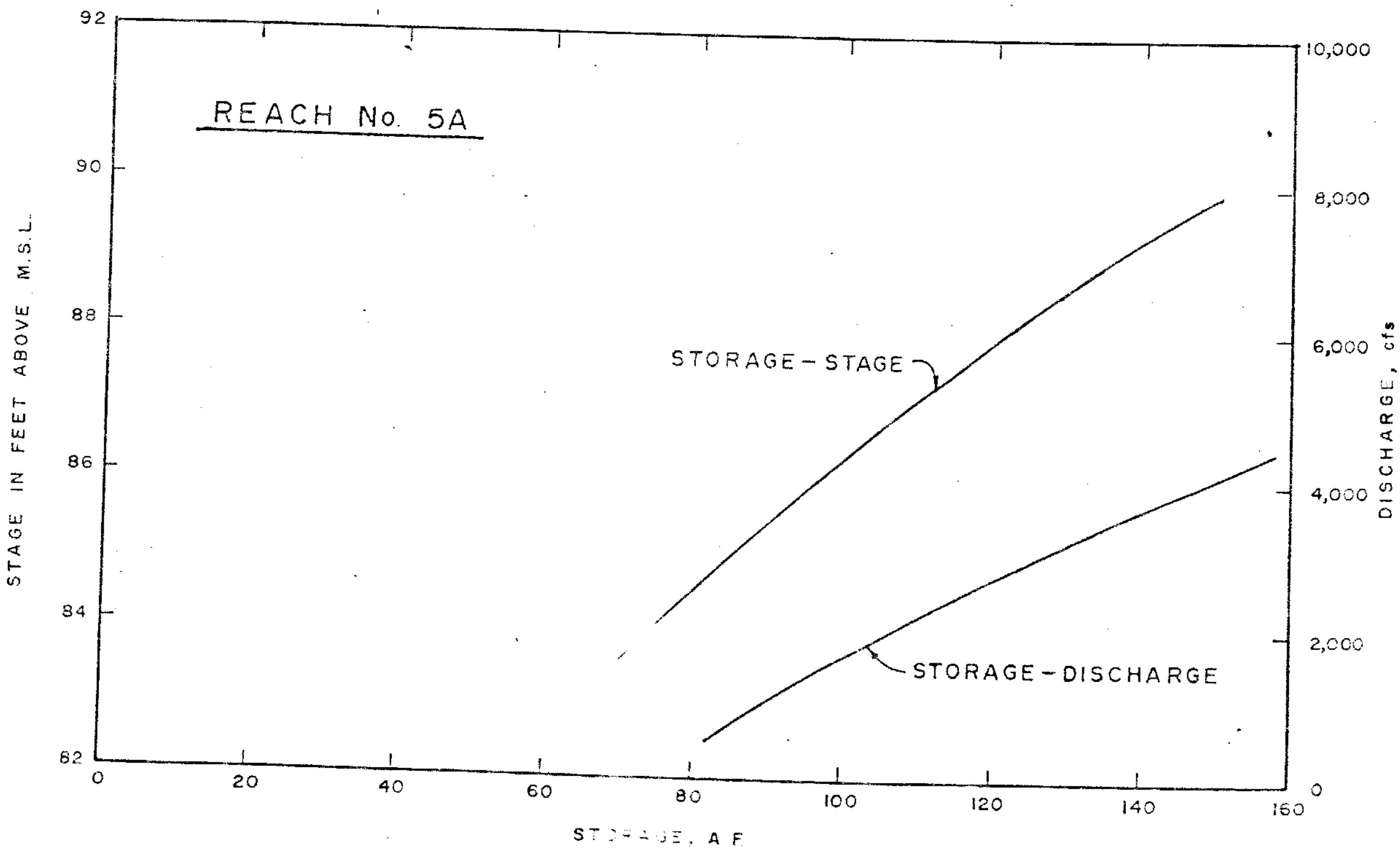
3 B

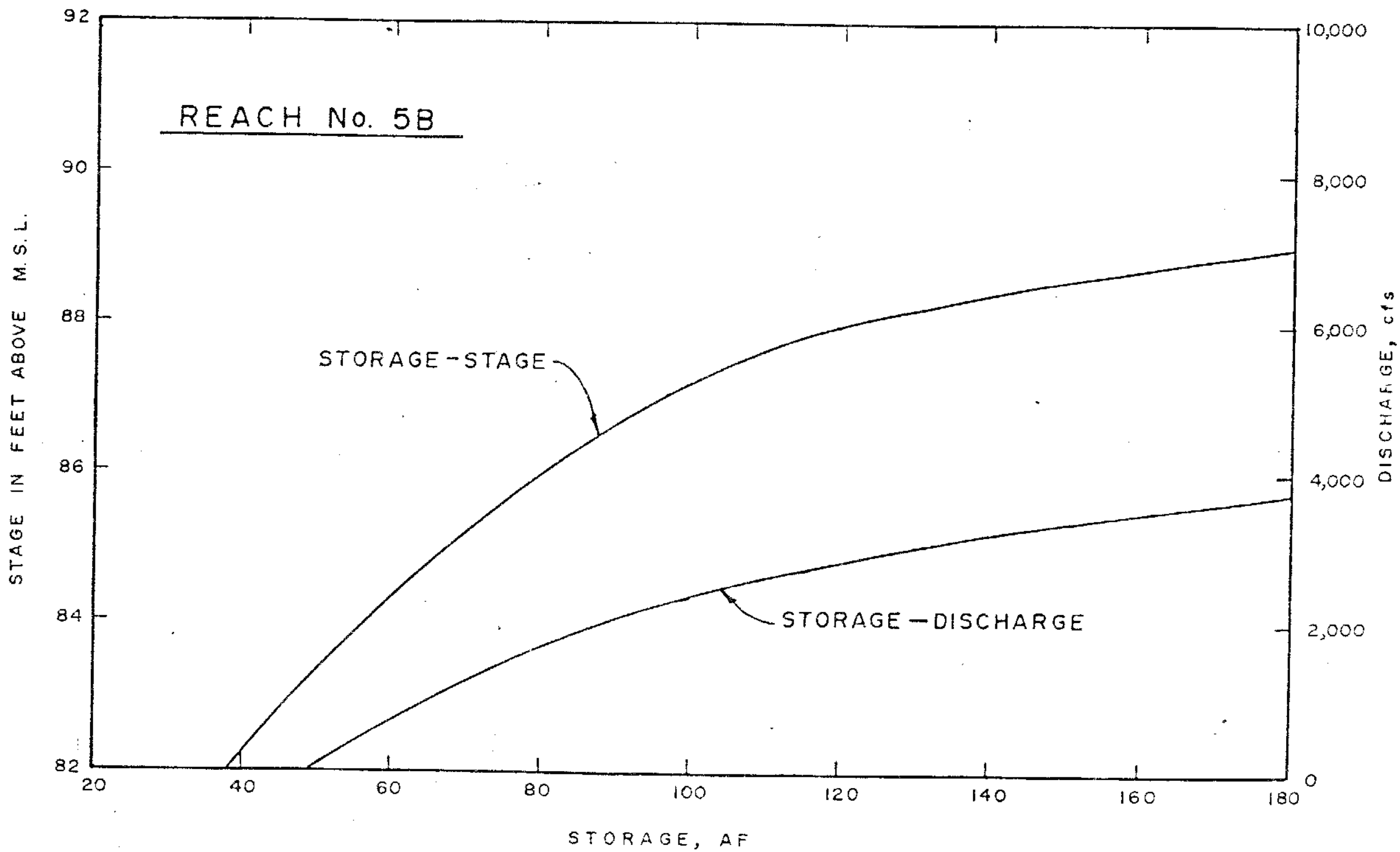

REACH No. 2B
STORAGE—STAGE
STORAGE—DISCHARGE
STAGE IN FEET ABOVE M.S.L.
88
90
92
94
96
98
DISCHARGE, cfs
0
2,000
4,000
6,000
8,000
10,000
STORAGE, A.F.
0
400
800
1200
1600
2000
2400
2800
3200

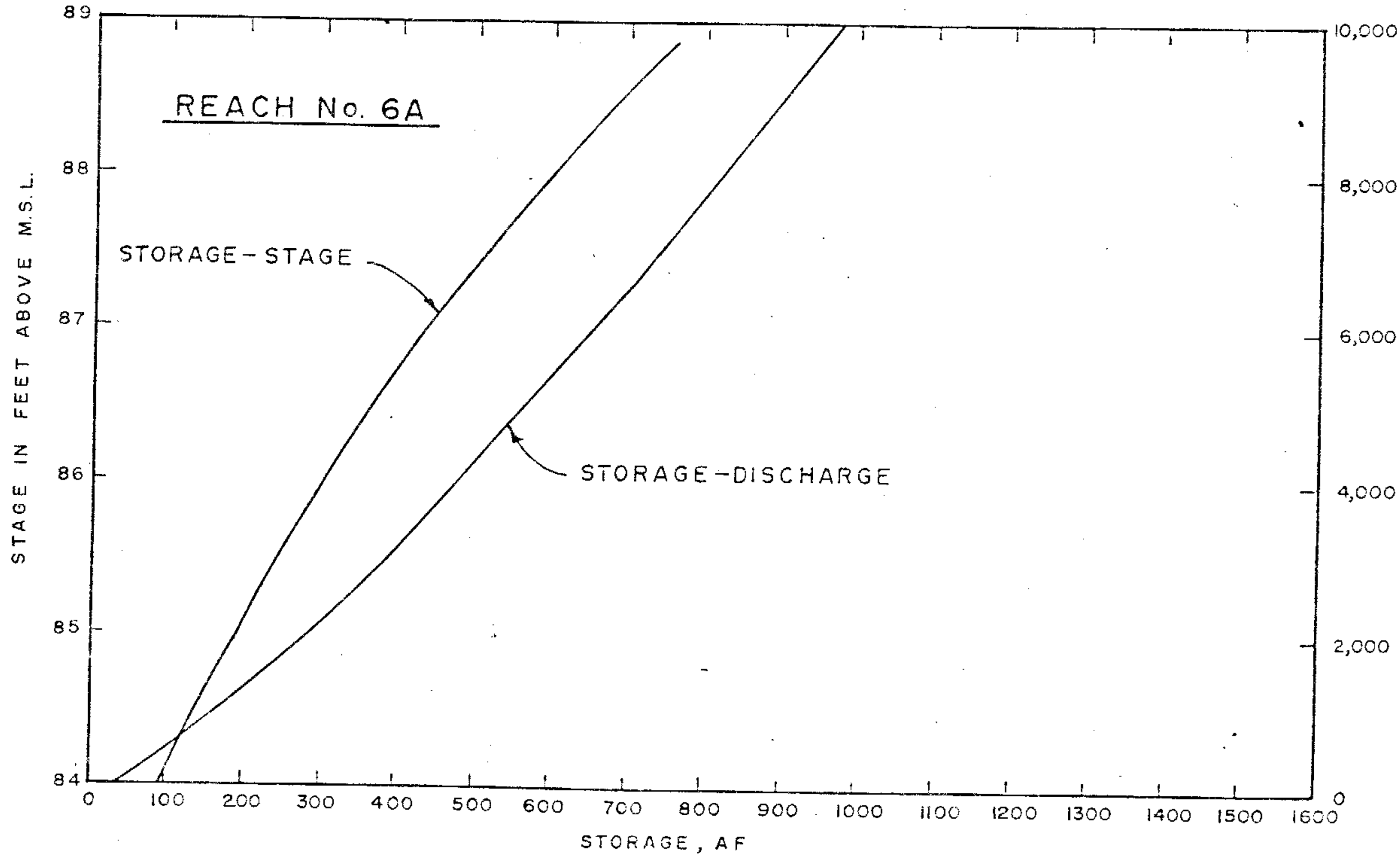

REACH No. 3
STORAGE — STAGE
STORAGE — DISCHARGE
STAGE IN FEET ABOVE M.S.L.
98
96
94
92
90
88
DISCHARGE, cfs
10,000
8,000
6,000
4,000
2,000
0
STORAGE, AF
0
200
400
600
800
1000
1200
1400
1600

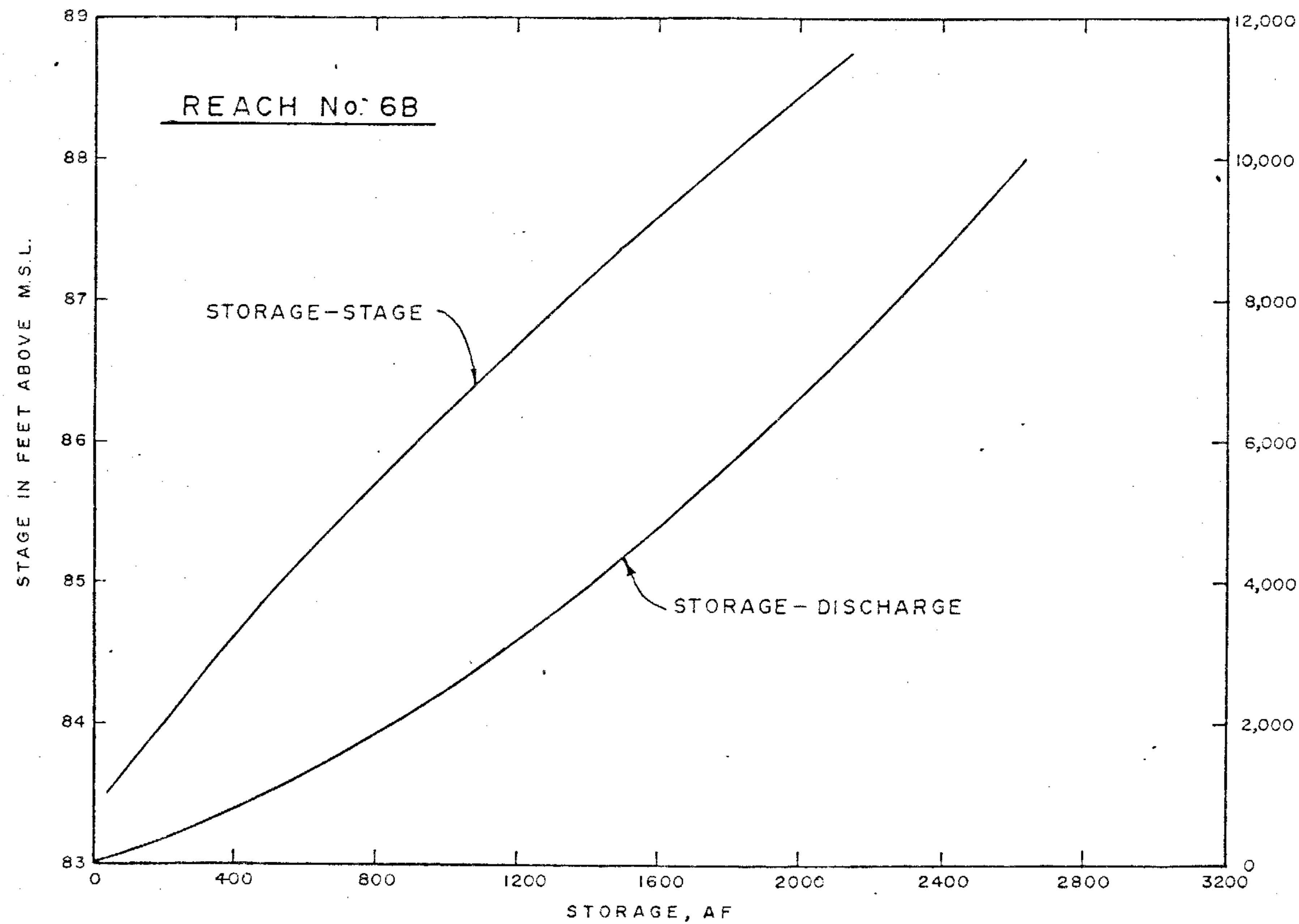

REACH No. 4
STORAGE — STAGE
STORAGE — DISCHARGE
STAGE IN FEET ABOVE M.S.L.
84
86
88
90
92
94
DISCHARGE, cfs
0
2,000
4,000
6,000
8,000
10,000
STORAGE, AF
0
20
40
60
80
100
120
140
160

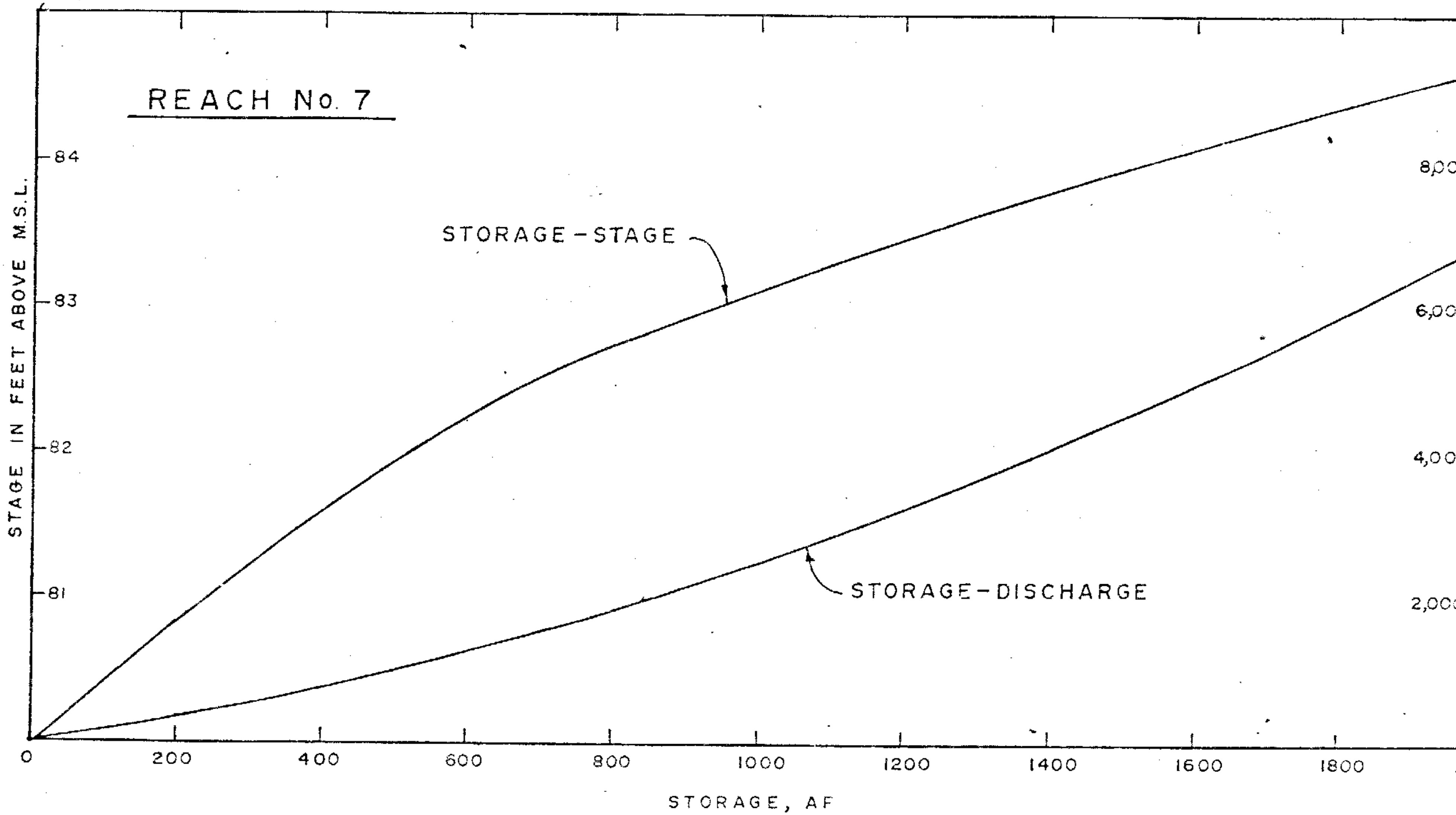
5B

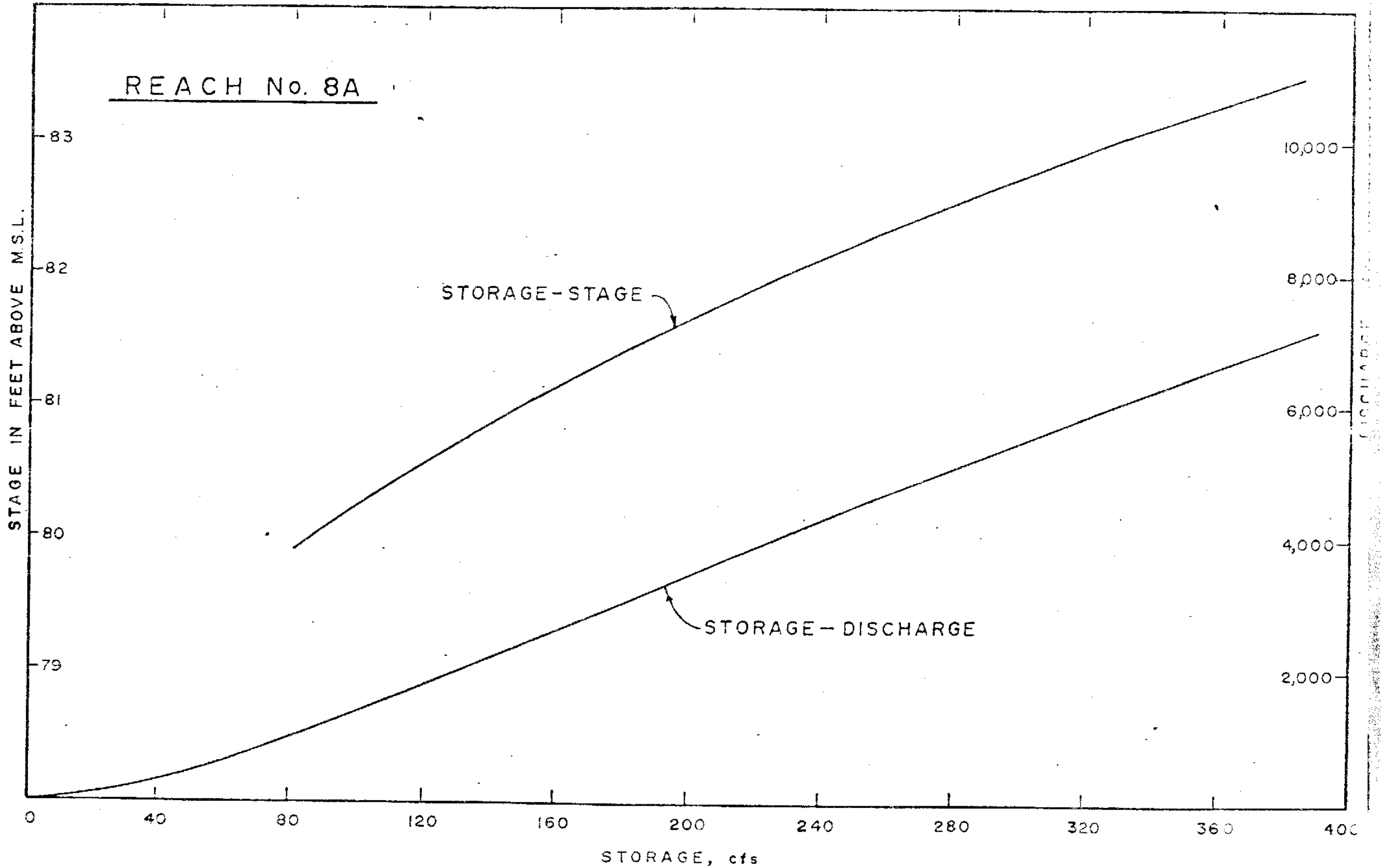

REACH No. 5A
STAGE IN FEET ABOVE M.S.L.
92
90
88
86
84
82
0
20
40
60
80
100
120
140
160
STORAGE - STAGE
STORAGE - DISCHARGE
10,000
8,000
6,000
4,000
2,000
0
DISCHARGE, cfs

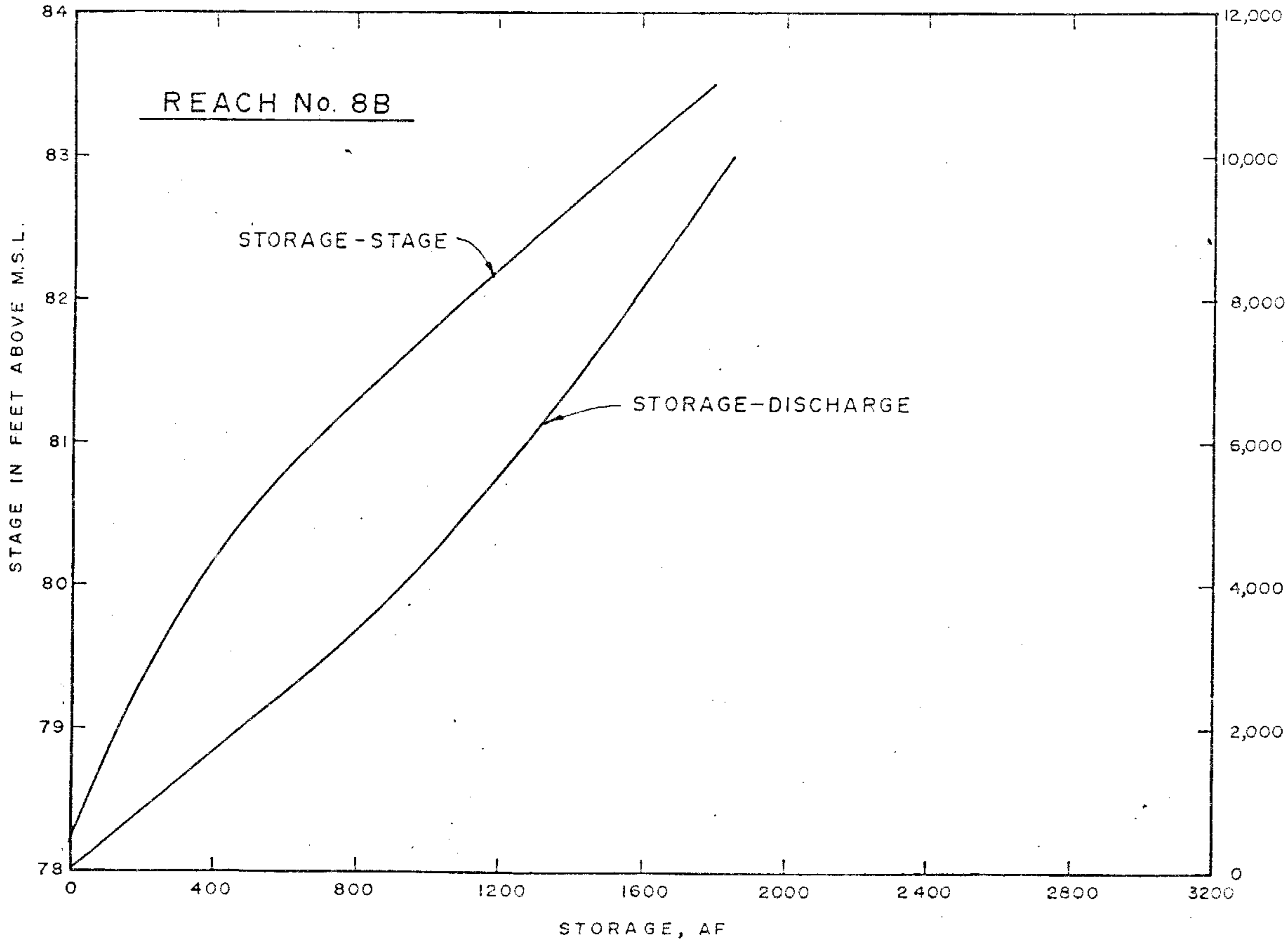

REACH No. 5B
STORAGE-STAGE
STORAGE—DISCHARGE
STAGE IN FEET ABOVE M.S.L.
DISCHARGE, cfs
STORAGE, AF
92
90
88
86
84
82
10,000
8,000
6,000
4,000
2,000
0
20
40
60
80
100
120
140
160
180

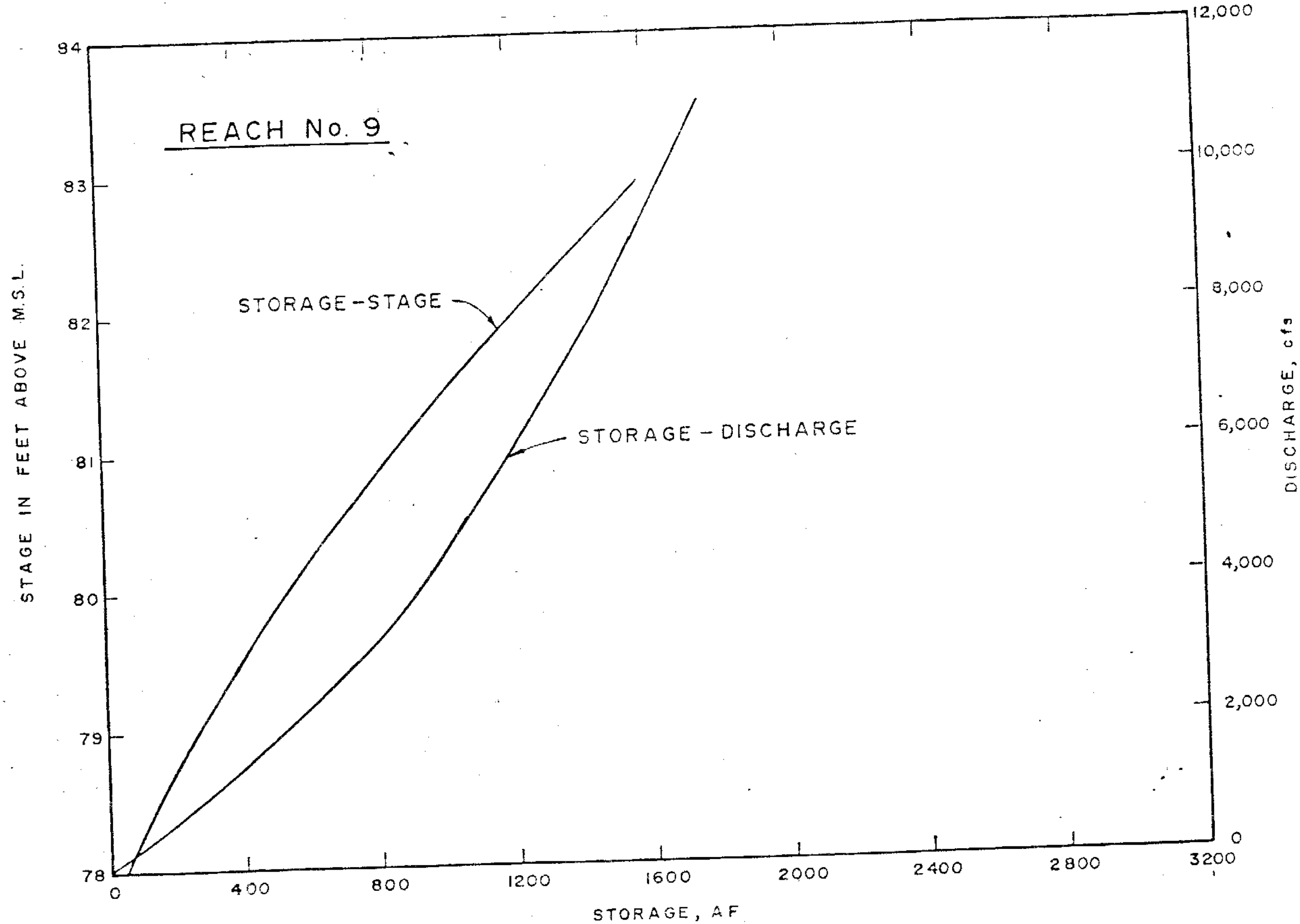

REACH No. 6A
STAGE IN FEET ABOVE M.S.L.
84
85
86
87
88
89
STORAGE-STAGE
STORAGE-DISCHARGE
STORAGE, AF
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
DISCHARGE, cfs
0
2,000
4,000
6,000
8,000
10,000


REACH No. 6B
STORAGE-STAGE
STORAGE- DISCHARGE
STAGE IN FEET ABOVE M.S.L.
89
88
87
86
85
84
83
DISCHARGE, cfs
12,000
10,000
8,000
6,000
4,000
2,000
0
STORAGE, AF
0
400
800
1200
1600
2000
2400
2800
3200

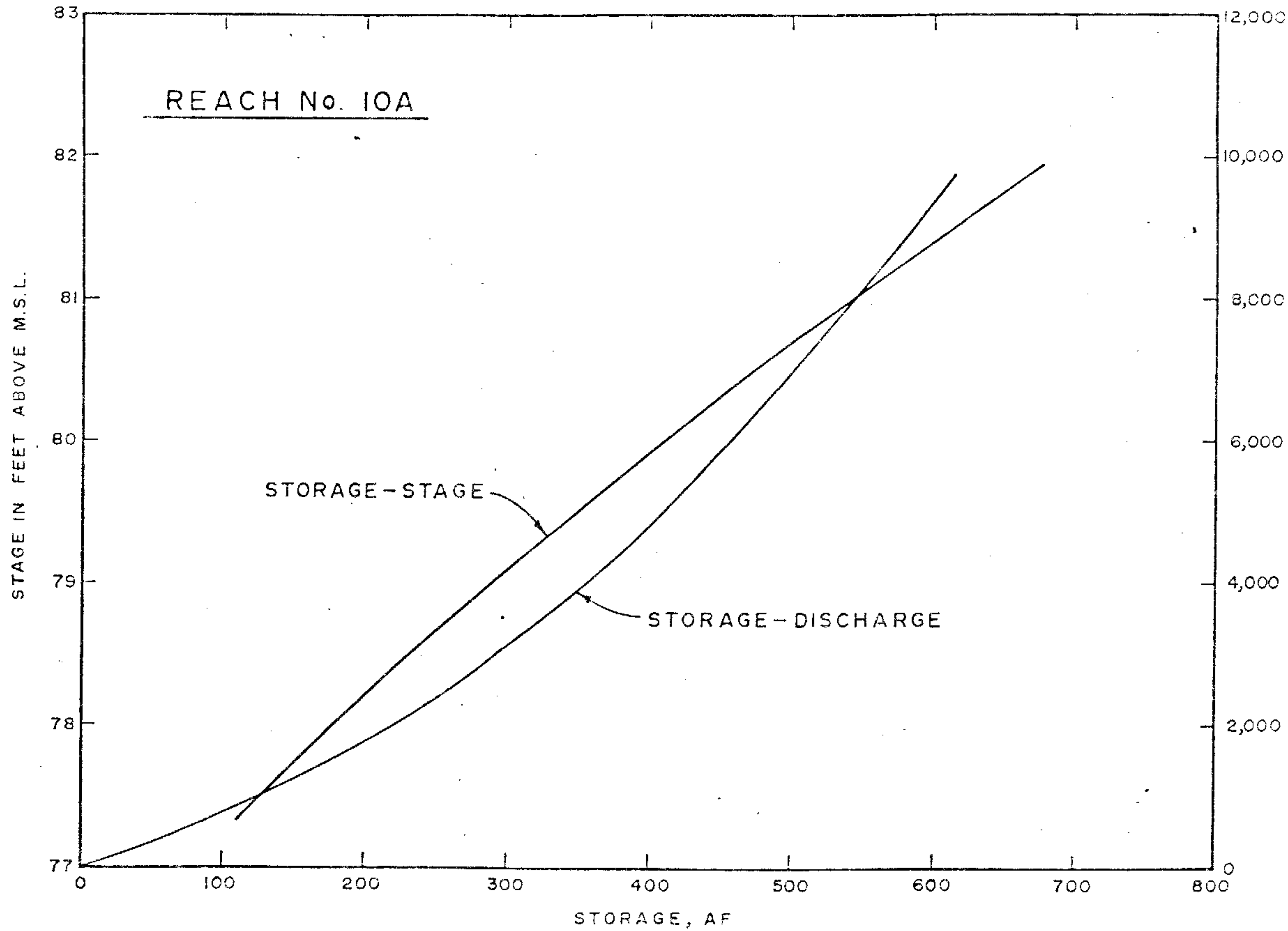

REACH No. 7
STORAGE - STAGE
STORAGE - DISCHARGE
STAGE IN FEET ABOVE M.S.L.
81
82
83
84
0
200
400
600
800
1000
1200
1400
1600
1800
STORAGE, AF


REACH No. 8A
STORAGE-STAGE
STORAGE-DISCHARGE
STAGE IN FEET ABOVE M.S.L.
79
80
81
82
83
0
40
80
120
160
200
240
280
320
360
400
STORAGE, cfs
2,000
4,000
6,000
8,000
10,000

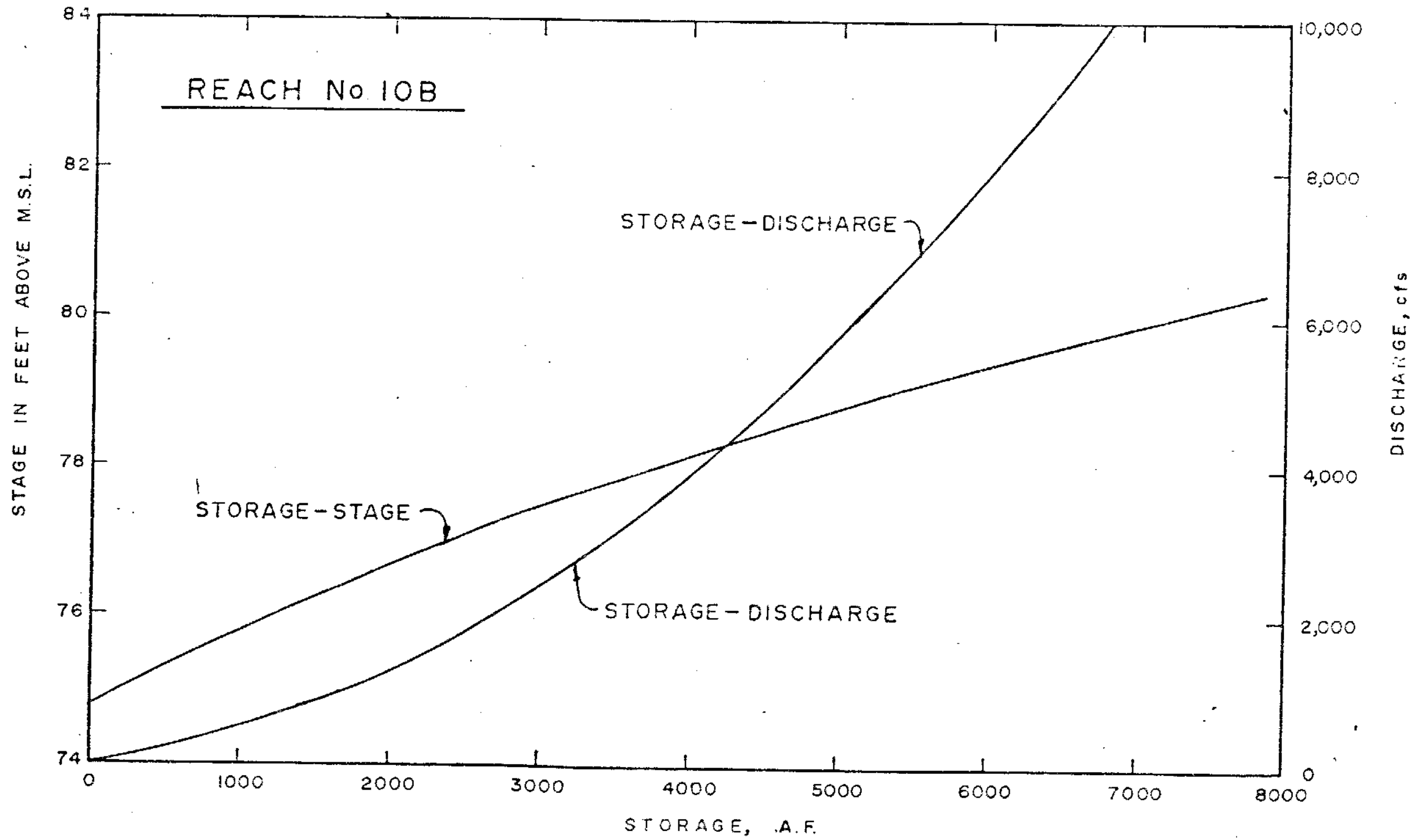

REACH No. 8B
STORAGE-STAGE
STORAGE-DISCHARGE
STAGE IN FEET ABOVE M.S.L.
84
83
82
81
80
79
78
0
400
800
1200
1600
2000
2400
2800
3200
STORAGE, AF
12,000
10,000
8,000
6,000
4,000
2,000
0
DISCHARGE, cfs

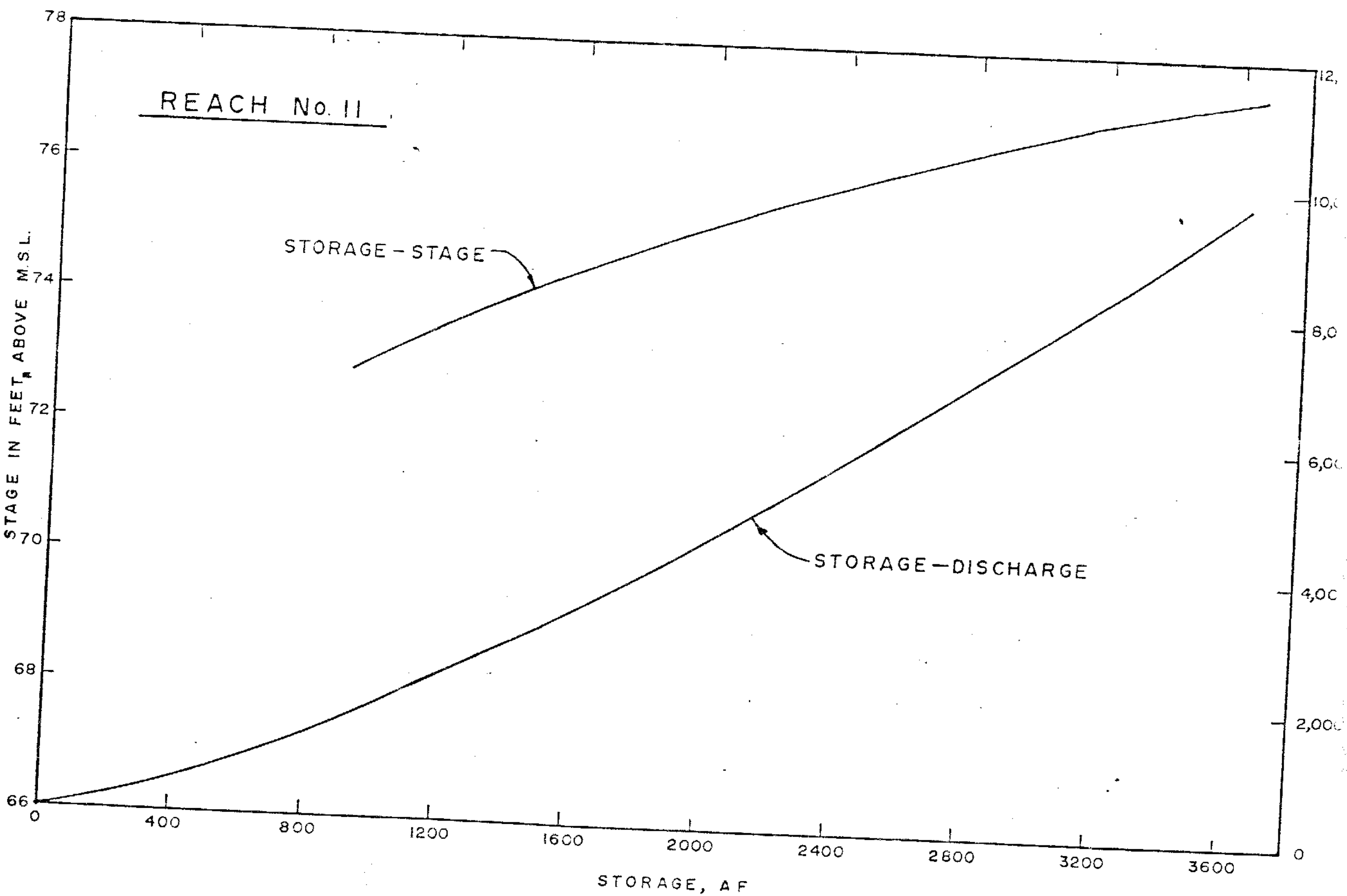

REACH No. 9
STORAGE-STAGE
STORAGE - DISCHARGE
STAGE IN FEET ABOVE M.S.L.
78
79
80
81
82
83
84
STORAGE, AF
0
400
800
1200
1600
2000
2400
2800
3200
DISCHARGE, cfs
0
2,000
4,000
6,000
8,000
10,000
12,000

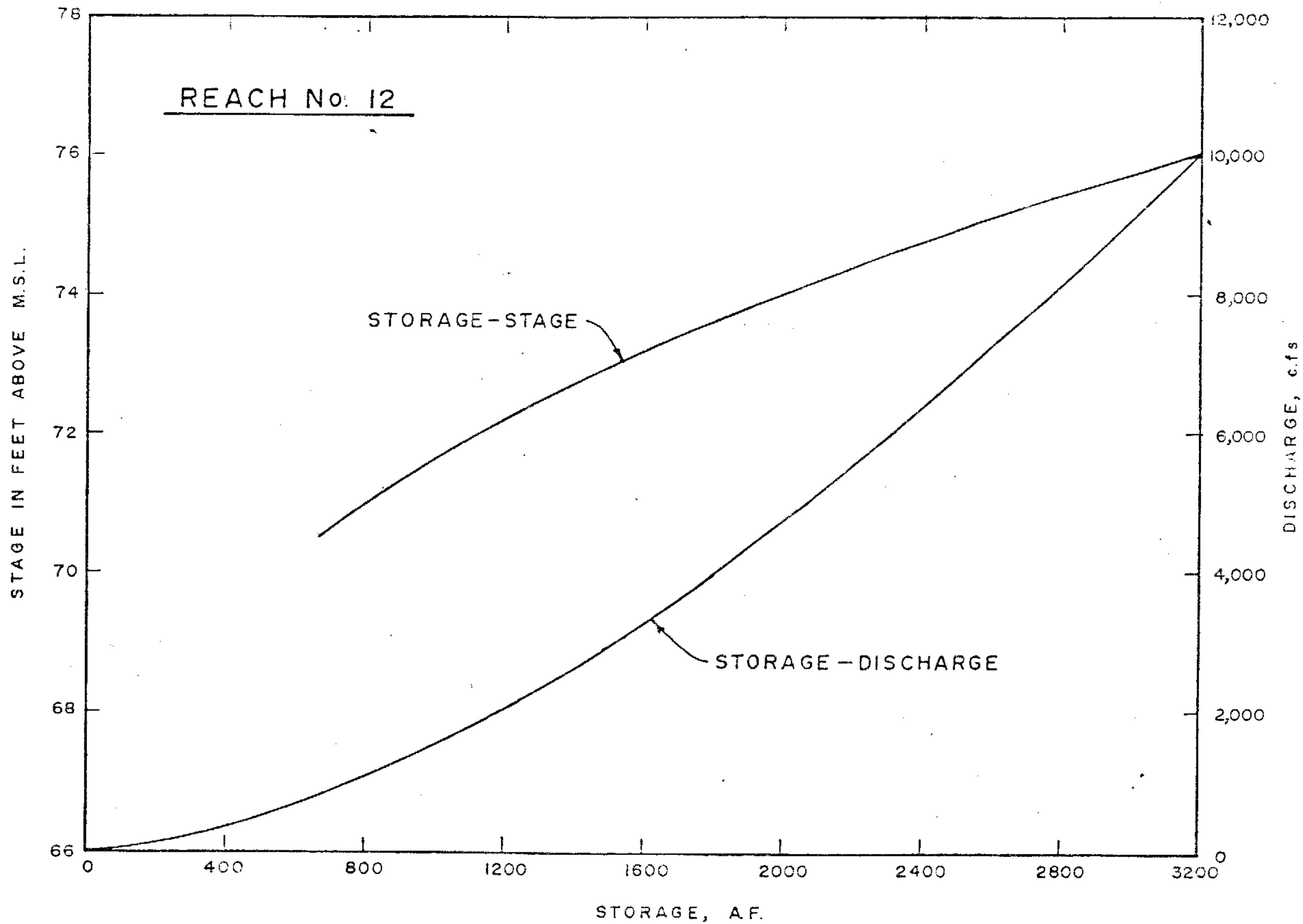
13B

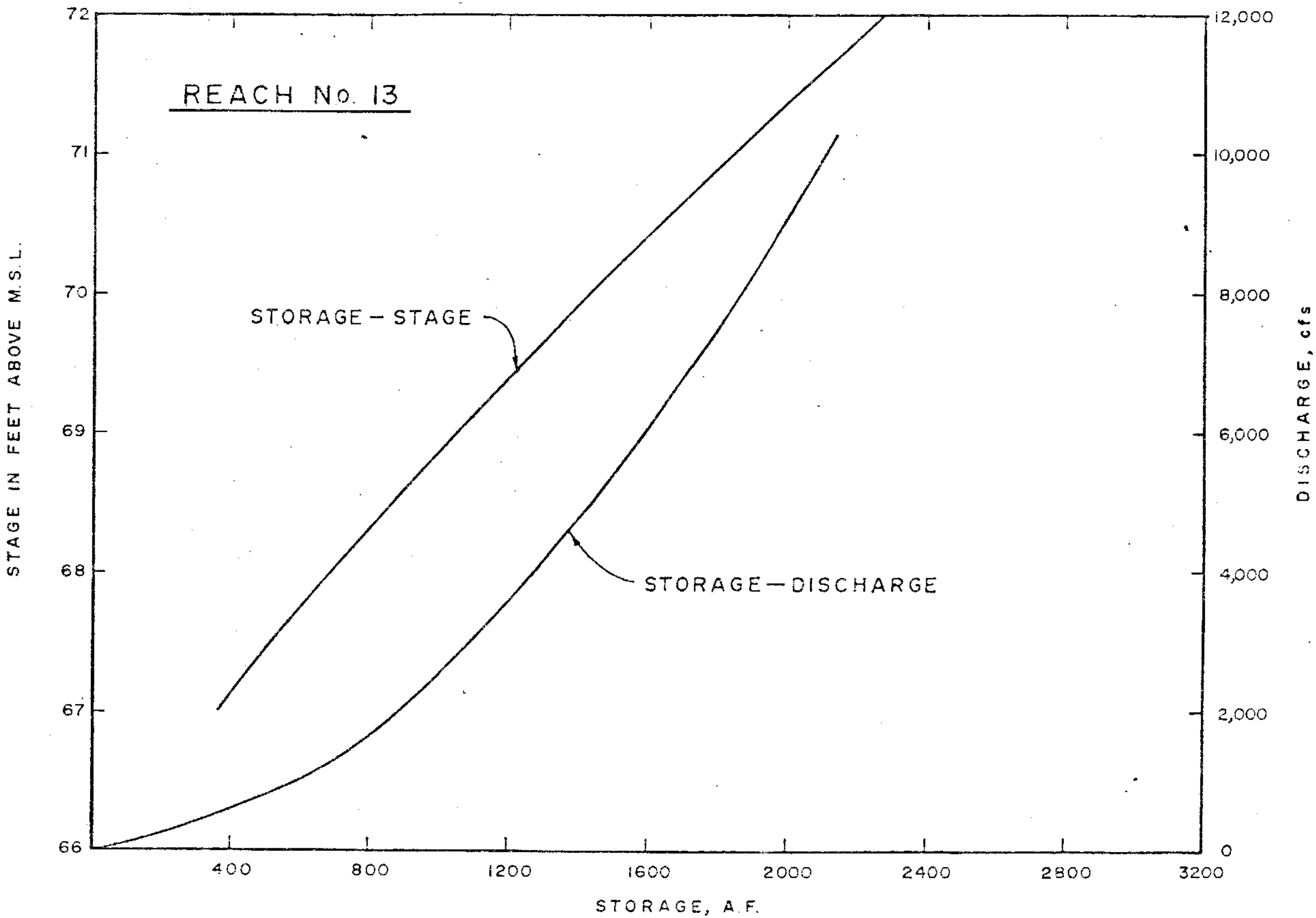

REACH No. 10A
STORAGE-STAGE
STORAGE-DISCHARGE
STAGE IN FEET ABOVE M.S.L.
77
78
79
80
81
82
83
STORAGE, AF
0
100
200
300
400
500
600
700
800
DISCHARGE, cfs
0
2,000
4,000
6,000
8,000
10,000
12,000

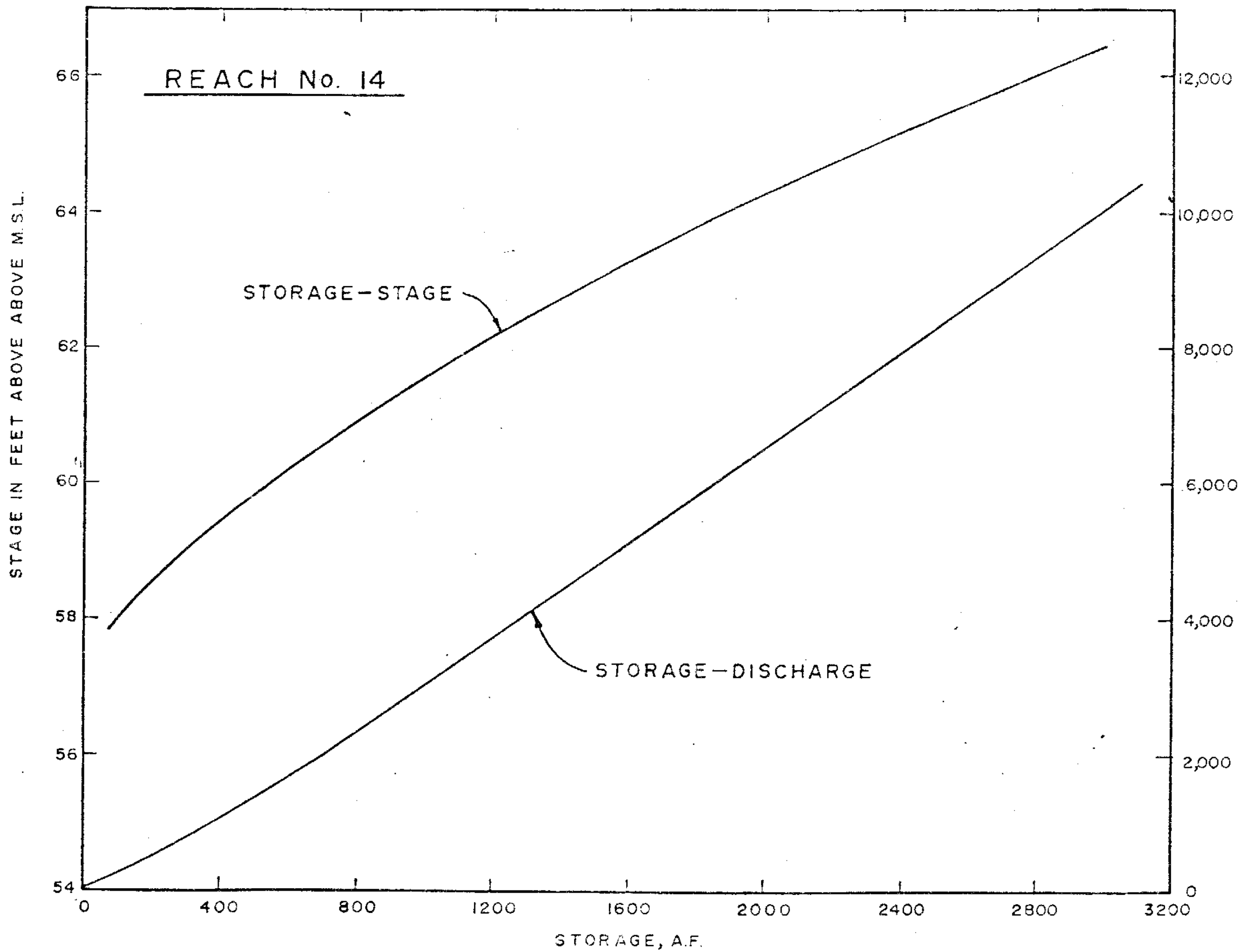
14B

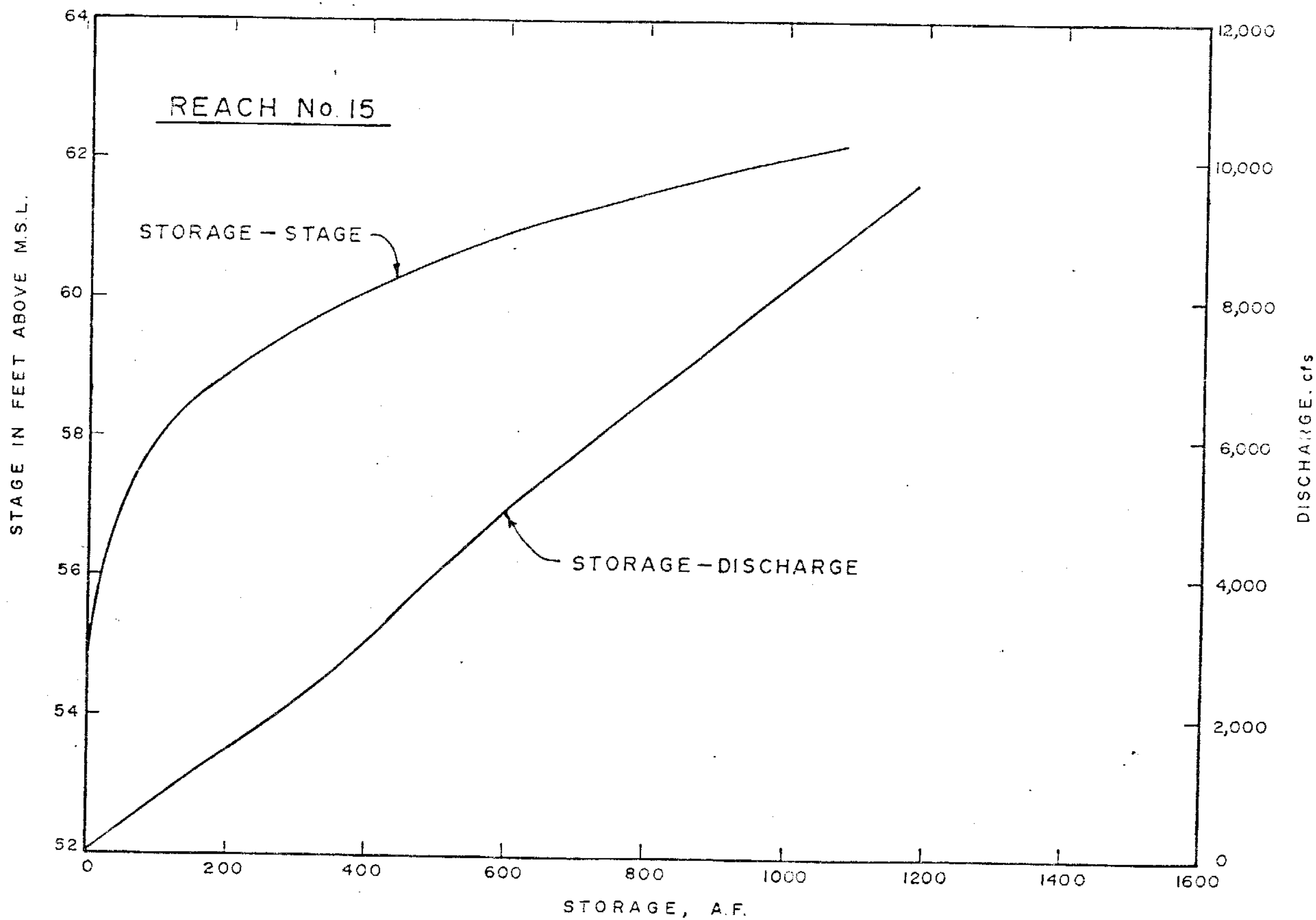

REACH No 10B
STAGE IN FEET ABOVE M.S.L.
84
82
80
78
76
74
STORAGE-DISCHARGE
STORAGE-STAGE
STORAGE-DISCHARGE
DISCHARGE, cfs
10,000
8,000
6,000
4,000
2,000
0
0
1000
2000
3000
4000
5000
6000
7000
8000
STORAGE, A.F.

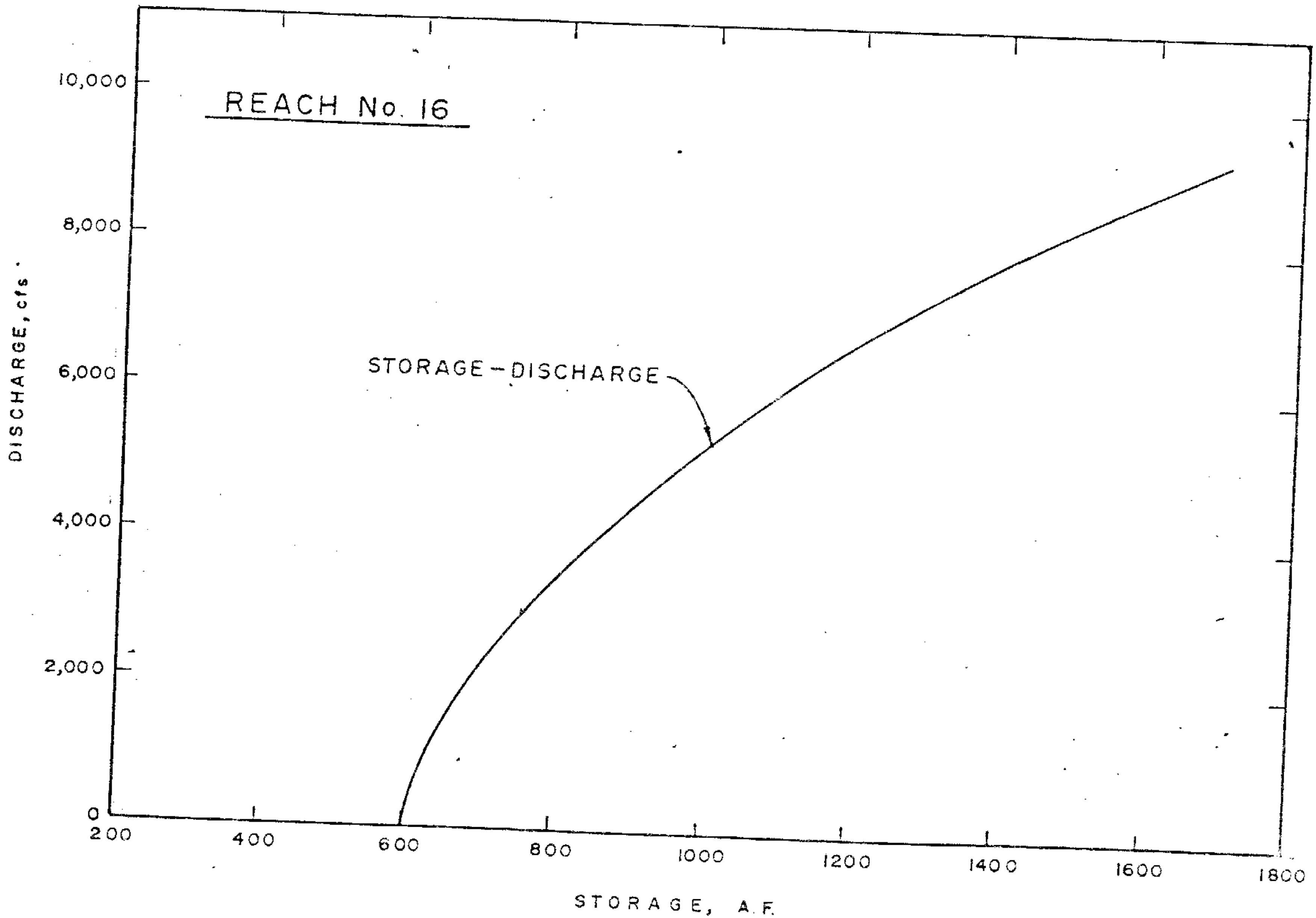

REACH No. II
STORAGE - STAGE
STORAGE—DISCHARGE
STAGE IN FEET ABOVE M.S.L.
STORAGE, AF
66
68
70
72
74
76
78
0
400
800
1200
1600
2000
2400
2800
3200
3600
2,00
4,00
6,00
8,0
10,
12,


REACH No. 12
STORAGE-STAGE
STORAGE-DISCHARGE
STAGE IN FEET ABOVE M.S.L.
66
68
70
72
74
76
78
STORAGE, A.F.
0
400
800
1200
1600
2000
2400
2800
3200
DISCHARGE, c.fs
0
2,000
4,000
6,000
8,000
10,000
12,000


REACH No. 13
STORAGE — STAGE
STORAGE — DISCHARGE
STAGE IN FEET ABOVE M.S.L.
66
67
68
69
70
71
72
DISCHARGE, cfs
0
2,000
4,000
6,000
8,000
10,000
12,000
STORAGE, A.F.
400
800
1200
1600
2000
2400
2800
3200


REACH No. 14
STORAGE-STAGE
STORAGE-DISCHARGE
STAGE IN FEET ABOVE ABOVE M.S.L.
DISCHARGE, cfs
STORAGE, A.F.
54
56
58
60
62
64
66
0
400
800
1200
1600
2000
2400
2800
3200
0
2,000
4,000
6,000
8,000
10,000
12,000


REACH No. 15
STORAGE – STAGE
STORAGE – DISCHARGE
STAGE IN FEET ABOVE M.S.L.
64
62
60
58
56
54
52
DISCHARGE, cfs
12,000
10,000
8,000
6,000
4,000
2,000
0
STORAGE, A.F.
0
200
400
600
800
1000
1200
1400
1600


REACH No. 16
STORAGE – DISCHARGE
DISCHARGE, cfs
10,000
8,000
6,000
4,000
2,000
0
200
400
600
800
1000
1200
1400
1600
1800
STORAGE, A.F.

APPENDIX C

Committed Land Use in Shingle Creek Basin

Planning Unit #1 Runoff Number = 85

LAND USE	Acreage Acre	% of Area	% of Imp	Col (2)x(3)/100
Residential low & medium density	1255.72	53.10	40	21.24
Residential High Density	13.49	0.57	70	0.40
Commercial	396.84	16.64	85	14.14
Industrial	42.95	1.80	75	1.35
Parks, Recreation & Open Space	141.88	5.95	5	0.30
Undeveloped	90.61	3.80	0	0
Citrus Groves	43.85	1.84	0	0
Lakes & Ponds	388.64	16.30	100	16.30
TOTAL	2384.98			53.73

Used I = 55%

Planning Unit #2 Runoff Number = 85

LAND USE	ACREAGE ACRE	% of AREA	% of IMP.	COL (2)x(3)/100
Residential Low & Medium Density	777.50	49.97	40	19.99
Residential High density	28.47	1.83	70	1.28
Commercial	152.43	9.80	85	8.33
Industrial	275.02	17.68	75	13.26
Undeveloped	33.75	2.17	0	0
Lakes & Ponds	288.12	18.55	100	18.55
TOTAL	1555.8			61.41

Used I = 60%

Planning Unit #4

Runoff Number = 85

LAND USE	ACREAGE ACRES	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	116.39	25.81	40	10.32
Commercial	55.56	12.32	85	10.47
Recreation	1.38	0.31	5	0.02
Undeveloped	221.53	49.13	0	0
Citrus Groves	54.87	12.17	0	0
Lakes & Ponds	1.15	0.26	100	0.26
TOTAL	450.88		Used I = 20%	21.07

Planning Unit #5

Runoff Number = 80

LAND USE	ACREAGE ACRES	% of AREA	% of IMP.	COL. 2x3/100
Commerical	34.21	7.46	85	6.34
Undeveloped	380.97	83.06	0	0
Citrus	43.27	9.43	0	0
Lakes & Ponds	0.23	0.05	100	0.05
TOTAL	1234.28		Used I = 5%	6.39%

Planning Unit #6 — Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL 2x3/100
Residential Low & Medium Density	842.29	68.24	40	27.30
Commerical	43.27	3.51	85	2.98
Undeveloped	341.6	27.68	0	0
Lakes & Ponds	7.12	0.57	100	0.57
TOTAL	1234.28			20.85 Use I = 30%

Planning Unit #8 — Runoff Number = 70

LAND USE	ACREAGE	% of AREA	% of IMP.	COL 2x3/100
Residential Low & Medium Density	44.08	1.98	40	0.8
Commercial	39.49	1.77	85	1.5
Undeveloped	729.11	32.74	0	0
Citrus Groves	1051.62	47.22	0	0
Lakes & Ponds	362.49	16.28	100	16.3
TOTAL	2226.79			18.6 Used I = 20%

Planning Unit #9 — Runoff Number = 80

LAND USE		
Undeveloped	267.68 Acres	0% Impervious

Planning Unit #10

Runoff Number = 85

LAND USE	ACREAGE ACRE	% of AREA	% of IMP.	COL 2x3/100
Residential Low & Medium Density	202.98	41.52	40	16.6
Commercial	9.25	1.89	85	1.6
Industrial	96.88	19.82	75	14.8
Recreation	21.81	4.46	5	0.2
Undeveloped	132.00	27.00	0	0
Lakes & Ponds	25.94	5.31	100	5.3
TOTAL	488.86			38.5 Used I = 40%

Planning Unit #11

Runoff Number = 85

LAND USE	ACREAGE ACRE	% of AREA	% of IMP.	COL 2x3/100
Residential High Density	75.3	9.07	70	6.4
Park Recreational & Open Space	84.94	10.23	5	0.5
Industrial	243.57	29.34	75	22.0
Undeveloped	425.39	51.24	0	0.
Lakes & Ponds	0.92	0.11	100	0.1
TOTAL	830.12			29.0 Used I = 30%

Planning Unit #13 Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	155.85	40.10	40	16.04
Residential High Density	21.87	5.63	70	3.94
Commerical	26.75	6.88	85	5.85
Recreation (Golf Course)	165.49	42.58	5	2.13
Undeveloped	2.36	0.61	0	0
Lakes and Ponds	16.34	4.20	100	4.20
TOTAL	388.66			32.16

Used I = 30%

Planning Unit #14 Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	109.50	50	40	20
Residential High Density	32.14	15	70	4.2
Recreation Golf Course	13.27	6	5	0.1
Undeveloped	62.90	29	0	0
TOTAL	222.11			24.3

Used I = 25%

Planning Unit #15 Runoff Number = 80

LAND USE

Undeveloped 246.33 Acres 0% Impervious

Planning Unit #17

Runoff Number = 95

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Commercial	175.93	91.6	85	77.9
Undeveloped	9.41	4.9	0	0
Lakes & Ponds	6.66	3.5	100	3.5
TOTAL	192.0			81.4 Used I = 80%

Planning Unit #19

Runoff Number = 80

LAND USE

Undeveloped 383.84 Acres 0% Impervious

Planning Unit #20

Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	151.97	15.62	40	6.25
Commercial	110.42	11.35	85	9.65
Industrial	302.34	31.08	75	23.31
Undeveloped	298.90	30.72	0	0.
Park & Recreation, Open Space	109.27	11.23	5	.56
TOTAL	972.90			39.77 Used I = 40%

Planning Unit #22 — Runoff Number = 85

LAND USE	ACREAGE ACRE	% of AREA	% of IMP.	COL 2x3/100
Residential Low & Med. Density	37.81	5	40	1.83
Residential High Density	253.08	31	70	21.52
Commercial	34.62	4	85	3.57
Undeveloped	497.73	60	0	0
TOTAL	823.24			26.92

Used I = 25%

Planning Unit #23 — Runoff Number = 80

LAND USE	ACREAGE ACRE	% of AREA	% of IMP.	COL 2x3/100
Residential Low & Med. Density	202.04	80.59	40	32.24
Undeveloped	48.19	19.12	0	0
Lakes & Ponds	0.46	0.18	100	0.18
TOTAL	250.69			32.42

Used I = 30%

Planning Unit #24 Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low Density	252.74	35	40	14.00
Residential High Density	72.62	10	70	7.00
Commercial	75.10	11	85	9.35
Industrial	38.22	5	75	3.95
Recreation	97.61	14	5	0.70
Undeveloped	174.61	24	0	0
Lakes & Ponds	9.03	1	100	1.00
TOTAL	719.93			35.8
			Used I = 35%	

Planning Unit #26 Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	213.29	69.94	40	27.98
Commercial	8.55	2.80	85	2.38
Industrial	23.62	7.75	75	5.81
Undeveloped	59.51	19.51	0	0
TOTAL	304.97			36.17
				Used I = 35%

Planning Unit #27 — Runoff Number = 90

LAND USE	ACREAGE ACRE	% of AREA	% of IMP.	COL 2x3/100
Residential High Density	22.81	10.38	70	7.27
Commercial	33.34	15.17	85	12.89
Industrial	129.29	58.83	75	44.12
Undeveloped	35.59	11.65	0	0
Lakes & Ponds	8.72	3.97	100	3.97
TOTAL	219.75			68.25 Used I = 70%

Planning Unit #28 — Runoff Number =95

LAND USE	ACREAGE ACRE	% of AREA	% of IMP.	COL 2x3/100
Residential High Density	88.35	12	70	8.4
Commercial	75.73	11	85	9.4
Industrial	445.42	61	75	45.8
Lake	115.93	16	100	16.0
TOTAL	725.43			79.6 Used I = 80%

Planning Unit #29 — Runoff Number = 80

LAND USE	ACREAGE	% of AREA	% of IMP.	COL 2x3/100
Residential Low & Med. Density	47.75	9.43	40	3.77
Commercial	16.99	3.36	85	2.85
Industrial	10.79	2.13	75	1.60
Undeveloped	430.67	85.08	0	0
TOTAL	506.2			8.23
		Used I = 10%		

Planning Unit #30 — Runoff Number = 90

LAND USE	ACREAGE	% of AREA	% of IMP.	COL 2x3/100
Industrial	506.43	92.38	75	69.3
Parks & Recreation & Open Space	41.78	7.62	5	0.4
TOTAL	548.21			69.7
		Used I = 70%		

Planning Unit #31 — Runoff Number = 90

LAND USE	ACREAGE	% of AREA	% of IMP.	COL 2x3/100
Commercial	42.24	3.43	85	2.92
Industrial	213.04	17.30	75	12.95
Undeveloped	975.90	79.26	0	0
TOTAL	1231.18			15.90
		Used I = 15%		

Planning Unit #32 — Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL 2x3/100
Industrial	335.05	24.1	75	18.1
Undeveloped	1041.22	74.8	0	0
Lakes & Ponds	15.61	1.1	100	1.1
TOTAL	1391.88		Used I = 20%	19.2

Planning Unit #33 — Runoff Number = 80

LAND USE	ACREAGE	% of AREA	% of IMP.	COL 2x3/100
Industrial	3.67	0.64	75	0.48
Undeveloped	505.51	87.62	0	0
Parks, Recreation, Open Space	67.72	11.74	5.[illegible]	0.59
TOTAL	576.9		Used I = 0%	1.07

Planning Unit #34 — Runoff Number = 80

LAND USE	ACREAGE	% of AREA	% of IMP.	COL 2x3/100
Industrial	33.98	4.6	75	3.45
Undeveloped	679.30	92.8	0	0
Lakes & Ponds	18.82	2.6	100	2.60
TOTAL	732.1		Used I = 5%	6.05

Planning Unit #35 Runoff Number = 90

LAND USE	ACREAGE	% of AREA	% of IMP.	COL 2x3/100
Industrial	254.68	94	75	70.5
Lakes	15.89	6	100	6
TOTAL	270.57		Used I = 75%	76.5

Planning Unit #36 Runoff Number = 80

Undeveloped 479.11 Acres Impervious = 0%

Planning Unit #37 Runoff Number = 80

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	106.45	4	40	1.6
Commercial	100.78	4	85	3.4
Industrial	206.68	8	75	6
Undeveloped	1087.16	41	0	0
Woods, Meadows, & Swamps	409.24	16	0	0
Pasture	657.09	25	0	0
Lakes & Ponds	57.48	2	100	2
TOTAL	2624.88		Used I = 15%	13.0

Planning Unit #38 Runoff Number = 80

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	11.25	0.55	40	0.22
Residential High Density	35.93	1.75	70	1.23
Commercial	98.48	4.81	85	4.09
Undeveloped	642.79	31.36	0	0
Woods, Meadows & Swamps	1092.29	53.29	0	0
Pasture	63.82	3.11	0	0
Specialty Crops	59.00	2.88	0	0
Lakes & Ponds	45.91	2.24	100	2.24
TOTAL	2049.47			7.78

Used I = 10%

Planning Unit #39 Runoff Number = 80

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	162.99	22.76	40	9.10
Residential High Density	22.96	3.21	70	2.25
Commercial	8.26	1.15	85	0.98
Undeveloped	453.40	63.32	0	0
Swamp	68.41	9.56	0	0
TOTAL	716.02			12.33

Used I = 10%

Planning Unit #41 Runoff Number = 80

LAND USE*	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	54.50	2.02	40	0.81
Industrial	6.89	0.26	75	0.20
Undeveloped	87.01	3.23	0	
Woods	1740.36	64.55	0	
Pasture	742.79	27.55	0	
Citrus & Specialty Crops	61.07	2.27	0	
Lakes & Ponds	3.21	0.12	100	0.12
TOTAL	2695.83			1.13

Used I = 0%

Planning Unit #42 Runoff Number = 80

3851.46 Acres I = 0%

Planning Unit #43 Runoff Number = 80

LAND USE	ACREAGE	
Woods, Meadows & Swamps		
Pasture	2075.29 Acres	I = 0%

Planning Unit #45 Runoff Number = 80

I = 0%

4227.04 Acres

PLANNING UNIT #46 Runoff Number = 80

No breakdown on Land Use	1344.81 Acres	I = 0%

PLANNING UNIT #47 Runoff Number = 80

No breakdown on Land Use	826.67 Acres	I = 0%

PLANNING UNIT #48 Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	91.83	12.80	40	5.12
Residential High Density	16.99	2.37	70	1.66
Commercial	7.81	1.09	85	0.93
Industrial	5.51	.77	75	0.58
Parks, Recreational & Open Spaces	176.31	24.58	5	1.23
Woods, Meadows, & Swamps	133.84	18.66	0	0
Pasture	225.90	31.50	0	0
Citrus Groves & Spec. Crops	56.93	7.94	0	0
Lakes	2.07	0.29	100	0.29
TOTAL	717.19			9.81

Used I = 10%

Planning Unit #49 Runoff Number = 80

LAND USE*	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	3.21	0.37	40	0.15
Residential High Density	11.25	1.31	70	0.92
Industrial	59.23	6.92	75	5.19
Parks, Recreational, Open Space	157.71	18.41	5	0.92
Woods, Meadows, Swamps	392.33	45.81	0	0
Pasture	184.80	21.58	0	0
Citrus Groves Spec. Crops	47.98	5.60	0	0
TOTAL	856.51		Used I = 5%	7.18

Planning Unit #50 Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	19.28	2.57	40	1.03
Residential High Density	3.21	0.43	70	0.30
Woods, Meadows, Swamps	430.21	57.25	0	0
Pasture	103.54	13.78	0	0
Citrus Groves & Spec. Crops	195.13	25.97	0	0
TOTAL	751.37		Used I = 0%	1.33

Planning Unit #51 Runoff Number = 80

LAND USE

9712 Acres 0% Impervious

Planning Unit #52 Runoff Number = 85

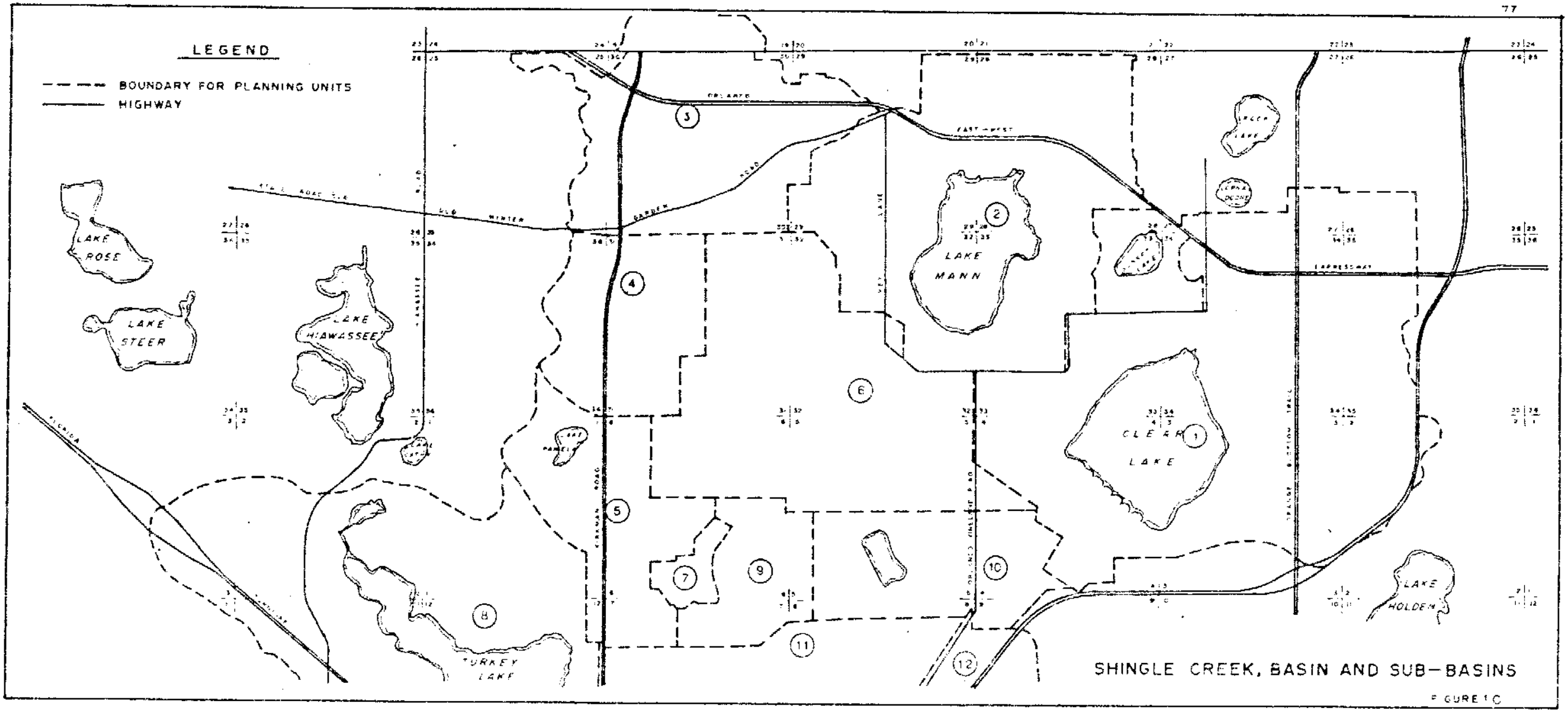
LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	69.79	12.09	40	4.84
Residential High Density	109.76	19.05	70	13.34
Parks, Recreational & Open Spaces	203.40	35.23	5	1.76
Woods, Meadows, & Swamps	170.11	29.46	0	0
Citrus, Groves & Spec. Crops	9.18	1.59	0	0
Lakes & Ponds	14.92	2.58	100	2.58
TOTAL	577.36			22.52
			Used I = 25%	

Planning Unit #53 Runoff Number = 85

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	87.70	14.40	40	5.76
Residential High Density	89.53	14.70	70	10.29
Parks, Recreational & Open Space	48.21	7.92	5	0
Woods, Meadows, Swamps	144.40	23.71	0	0
Pasture	223.93	36.78	0	0
Lakes & Ponds	15.15	2.49	100	2.49
TOTAL	608.92			18.94
			Used I = 20%	

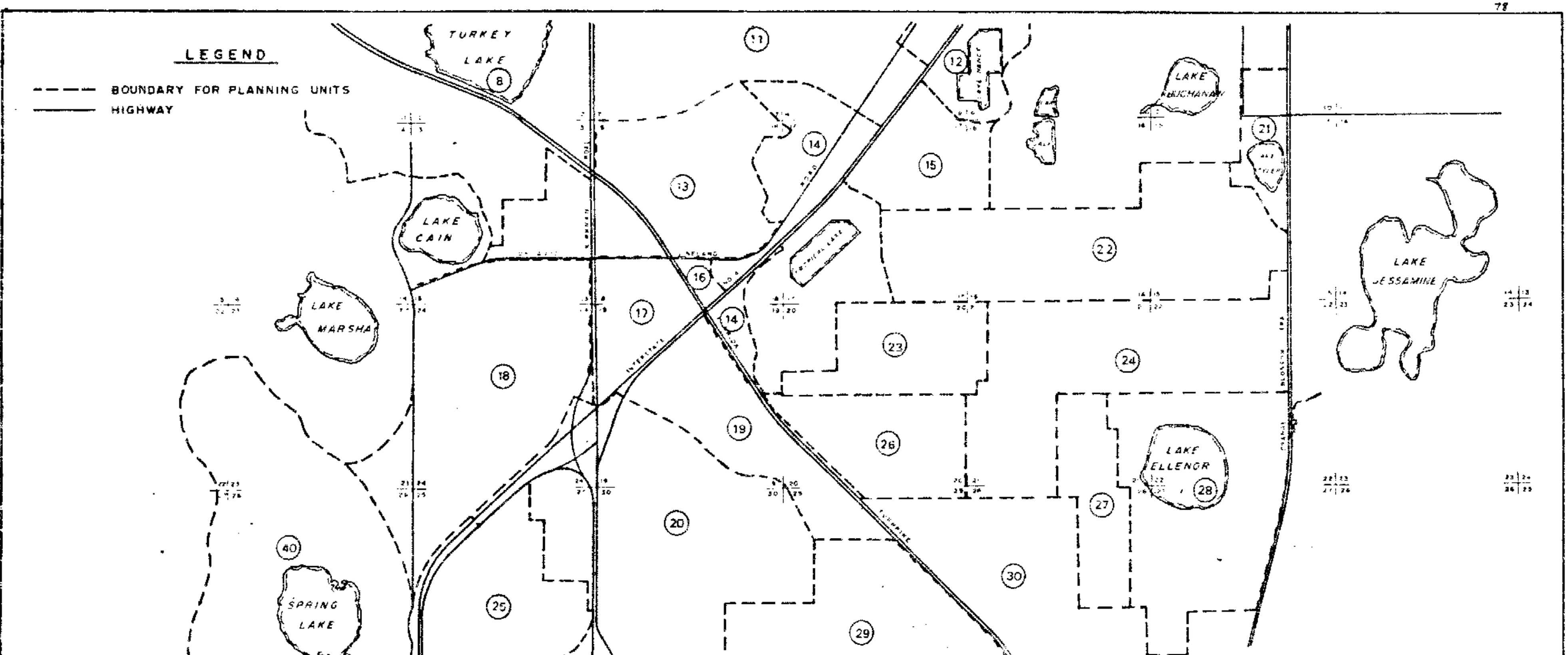
Planning Unit #54 Runoff Number = 80

LAND USE	ACREAGE	% of AREA	% of IMP.	COL. 2x3/100
Residential Low & Med. Density	41.55	6.01	40	2.40
Parks, Recreational & Open Space	26.40	3.82	5	0.19
Woods, Meadows & Swamps	116.39	16.84	0	0
Pasture	497.70	72.00	0	0
Lakes & Ponds	9.18	1.33	100	1.33
TOTAL	691.22		Used I = 5%	3.92



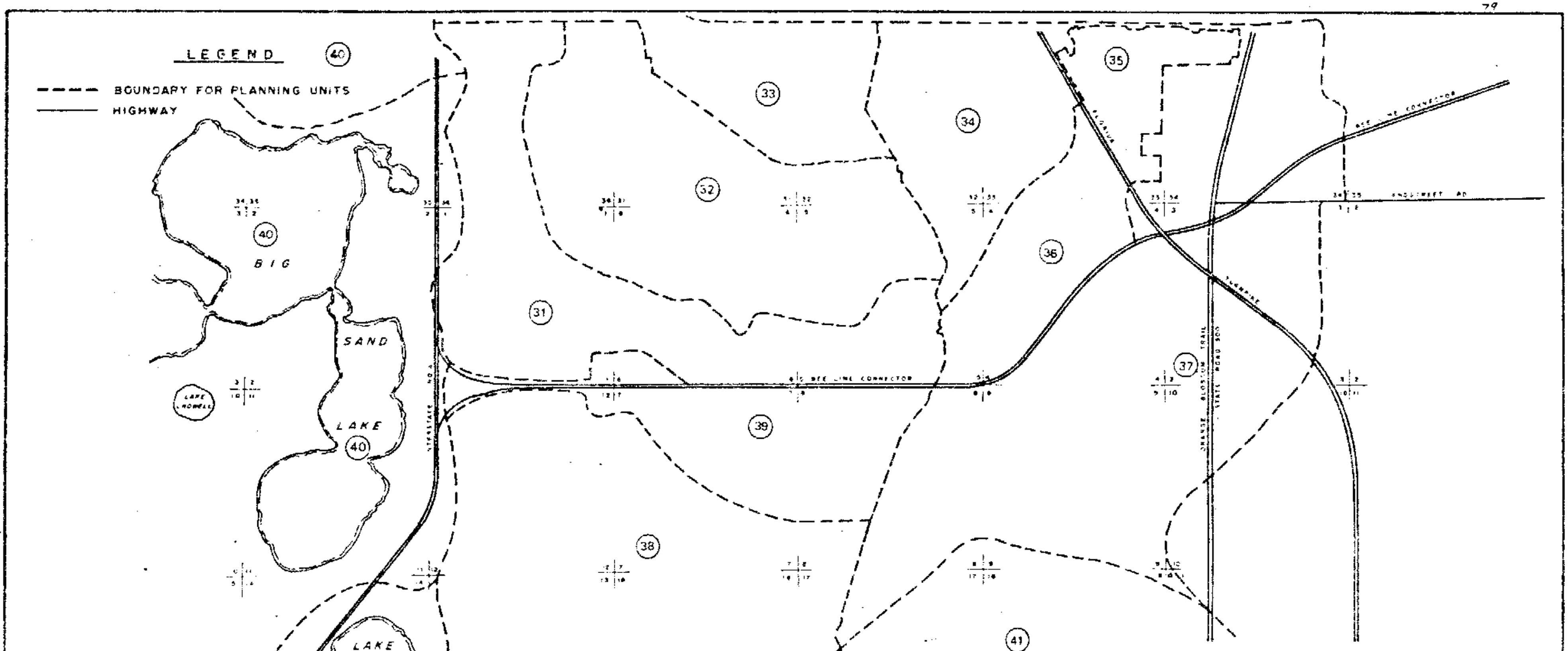
SHINGLE CREEK, BASIN AND SUB-BASINS

FIGURE 1C



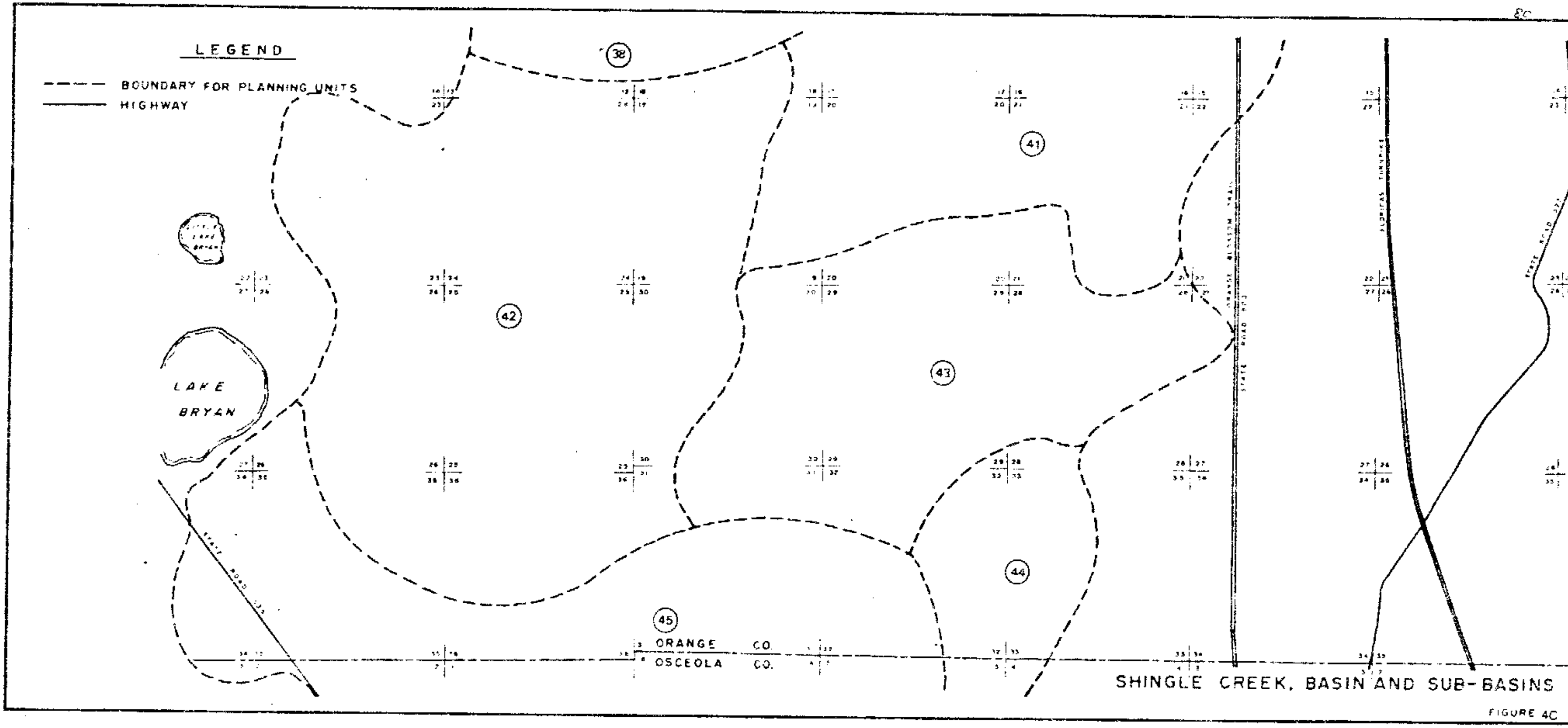
SHINGLE CREEK, BASIN AND SUB-BASINS

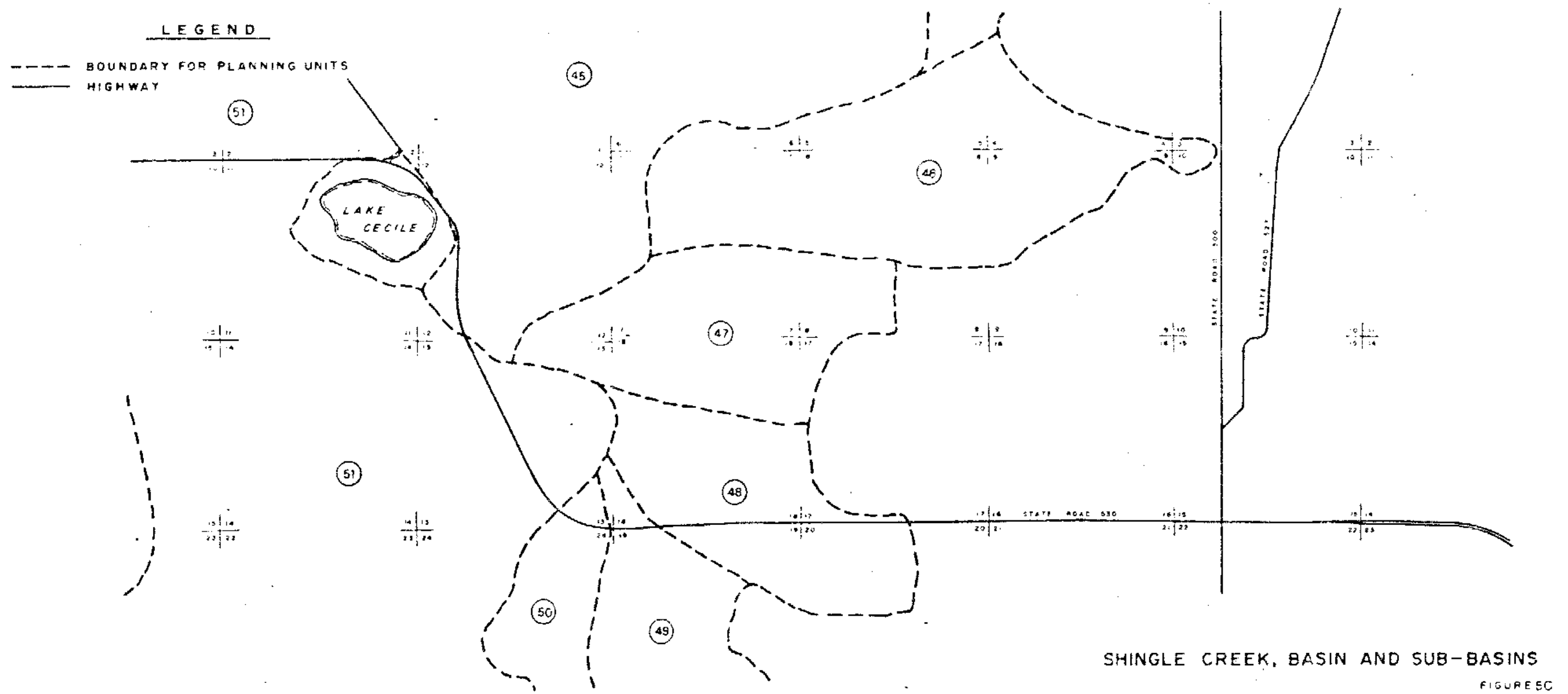
FIGURE 2C



SHINGLE CREEK, BASIN AND SUB-BASINS

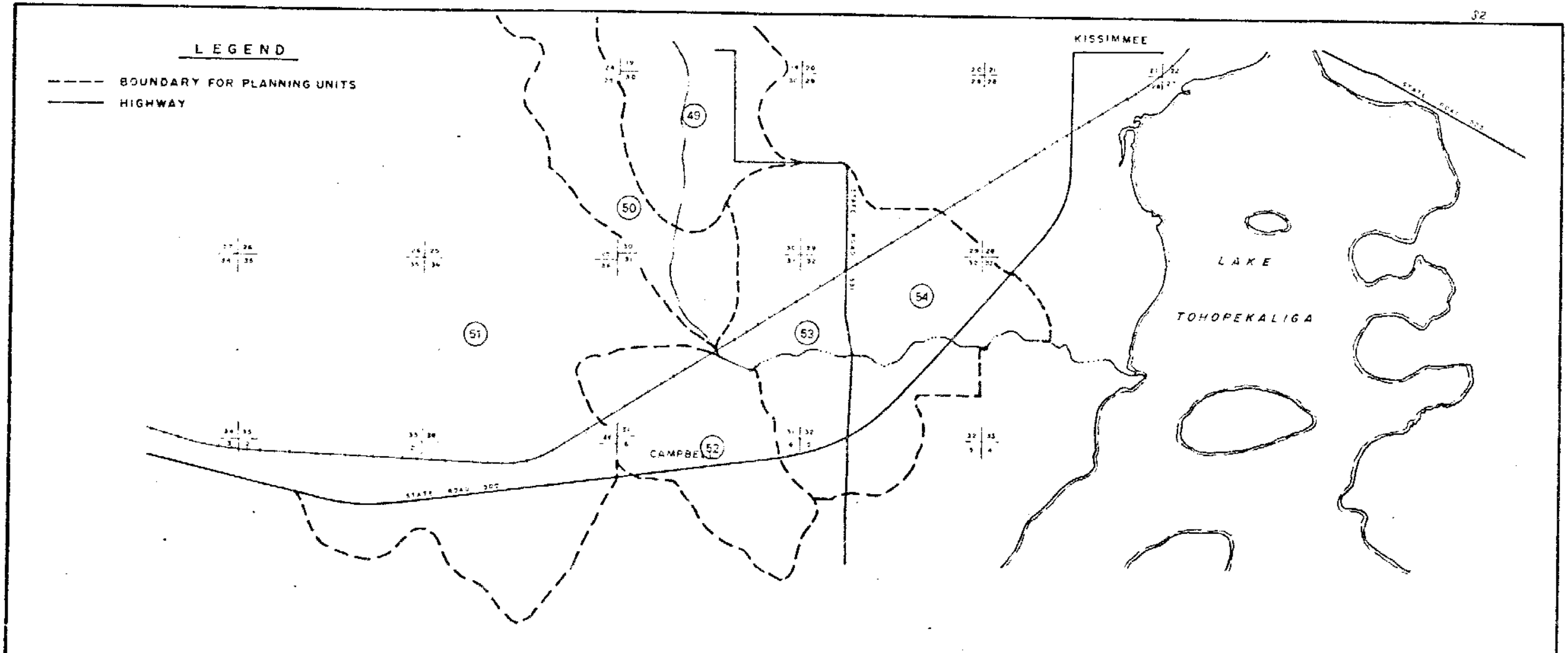
FIGURE 3C


LEGEND
BOUNDARY FOR PLANNING UNITS
HIGHWAY
LAKE BRYAN
38
41
42
43
44
45
ORANGE CO.
OSCEOLA CO.
SHINGLE CREEK, BASIN AND SUB-BASINS
FIGURE 4C



SHINGLE CREEK, BASIN AND SUB-BASINS

FIGURE 5C



SHINGLE CREEK, BASIN AND SUB-BASINS

FIGURE 6C

APPENDIX D

Amendment to Main Report

AMMENDMENTS TO MAIN REPORT ON SHINGLE CREEK FLOOD PLAIN STUDY

The preliminary result of the Shingle Creek Flood plain study was presented to representatives of Orange County, Osceola County, the City of Orlando and the City of Kissimmee of an interagency meeting held in the Public Works Office of Orange County on June 27, 1975. As a result of the meeting, the following suggestions were recommended to be incorporated into the water management plan for the Shingle Creek Watershed:

I. Improvements to the following bridges:
   A. State Road 600 (See Figure 1D)
   B. State Road 531 (See Figure 2D)
   C. Remove the Old Tampa Highway bridge
   D. At the bridges north of the Florida Turnpike excavate down to the design bottom elevation of the proposed channel section. (See Figures 3D, 4D, 5d and 6D

II. The need to consider a water control structure at the approximate Station 1207+00 to prevent overdrainage and to control erosion, we suggest a control stage upstream of 86 ft. msl. The proposed control structure should be designed to pass the 100 year storm with a 0.5 ft. head loss above the 100 year flood profile allowing a 0.5 ft. increase of water surface elevation above natural flood. In other words, a total of one foot above the natural flood profile was resulting.

In the reach north of station 1427+00 the design bottom elevation was dropped from 85 ft. msl to 83 ft. msl as an erosion control measure.

Based on the above mentioned improvements new 100 year flood profile, floodplain limit, and encroachment limit allowing for a 0.5 ft increase in flood stage were computed using the method previously described in the main report.

Figures 7D through 11D show the 100 year flood profile with channelization north of the Florida Turnpike with the above mentioned improvements to the bridge sections and with the proposed water control structure. Generally, the two profiles agreed closely except in the following reaches:

A. Between SR 600 and SR 531 there was no significant difference in flood stage, however, the velocity was reduced to less than ± 2.5 ft./sec. insead of the 5.2 and 10.1 ft./sec. velocities that existed before the improvements.

B. Between the S.C.L. Railroad and Station 454+00 the new profile varied from 1 ft. below the old profile at the S.C.L. Railroad to zero reduction at Station 454+00. The reduction in the width of the floodplain varied from 300 ft. at the S.C.L. Railroad to zero at Station 454+00. The encroachment line showed no significant reduction. To be on the conservative side the slight reduction in the floodplain should be ignored in the water management plan.

C. Reach from Station 1207+00 to Interstate 4 Station 1285+10 The profile for the improved condition is upt to 1.0 ft. higher than the previous profile. This was due to the head loss through water control mentioned previously in this text. However, this does not increase the floodplain area in this reach due to the fact that this reach has been developed and the ground elevation has been filled above flood stage. The flood was mostly confined in the channel except the reach between Oak Ridge Road and the proposed water control structure.

D. Reach from Station 1285+00 (i.e. Interstate 4) to Mcleod Road to Station 1373+85. The profile for the improved condition is much lower (over 2 foot) than the previous profile. Thereby, the flood flow is confined in the main channel. A substantial area of the existing floodplain would be available for development.

E. Reach from Mcleod Road Station 1373+85 up to the northern end of Shingle Creek. The flood stage ranges from 94.5 ft. msl at Mcleod Road to 95.61 ft. msl at the northern end of job. The lands in the reach from Station 1374+60 +0 station 1427+00 are low lying, with existing elevation mostly below 95.0 ft. msl., therefore, there will be some inundation in this reach. However, the existing developed area will be excluded from the floodplain. The flood will be contained in the main channel for the developed area north of Station 1445+00.

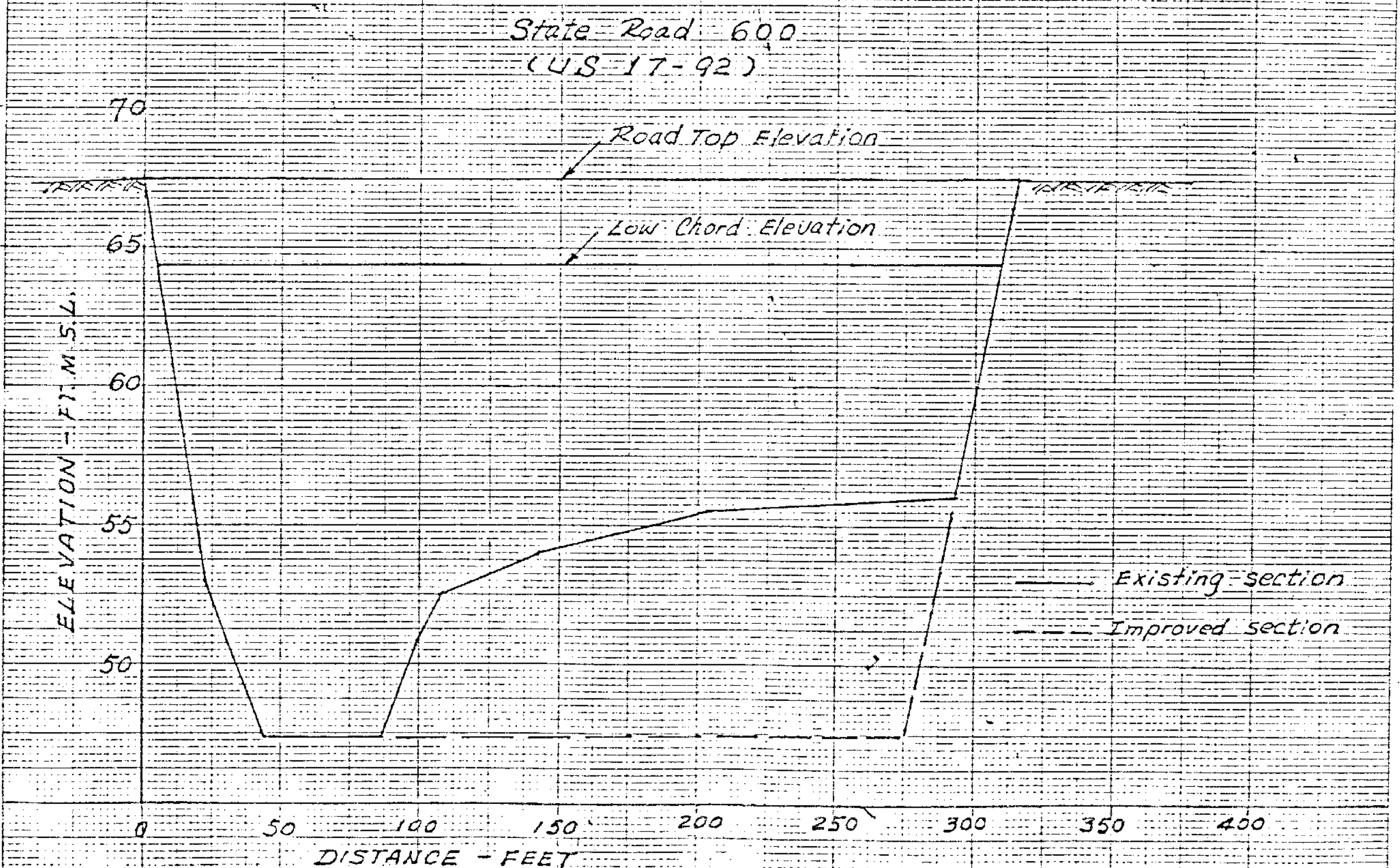


FIGURE 1D

SCALE : Hor. 1" = 50'
VERT. 1" = 5'

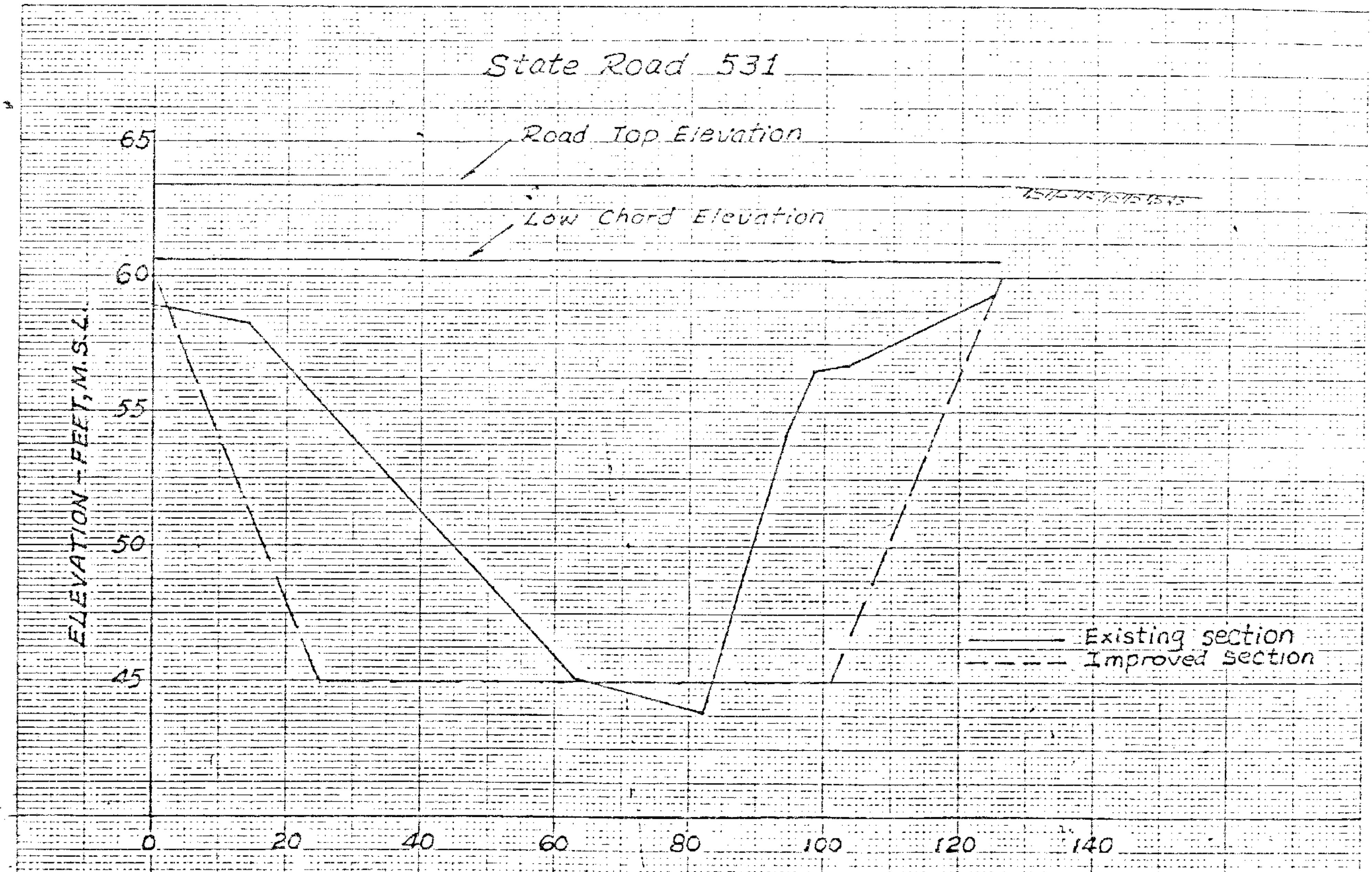
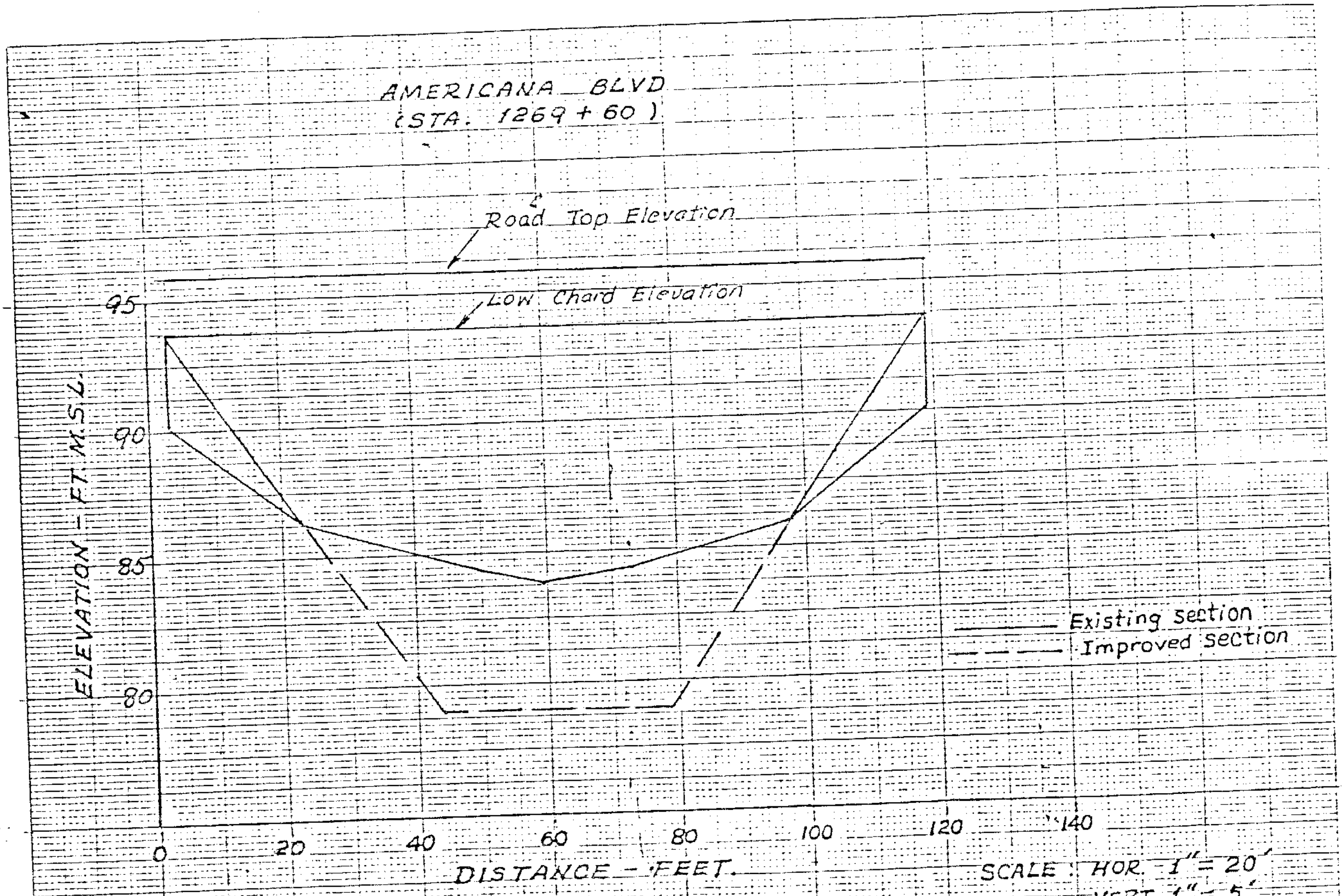

State Road 531
Road Top Elevation
Low Chord Elevation
ELEVATION - FEET, M.S.L.
65
60
55
50
45
0
20
40
60
80
100
120
140
DISTANCE - FEET
Existing section
Improved section
SCALE: HOR. 1" = 20'
VERT. 1" = 5'

FIGURE 2D



AMERICANA BLVD
(STA. 1269 + 60)
Road Top Elevation
Low Chord Elevation
95
90
85
80
ELEVATION - FT. M.S.L.
0
20
40
60
80
100
120
140
DISTANCE - FEET.
Existing section
Improved section
SCALE: HOR. 1" = 20'
VERT. 1" = 5'

FIGURE 3D

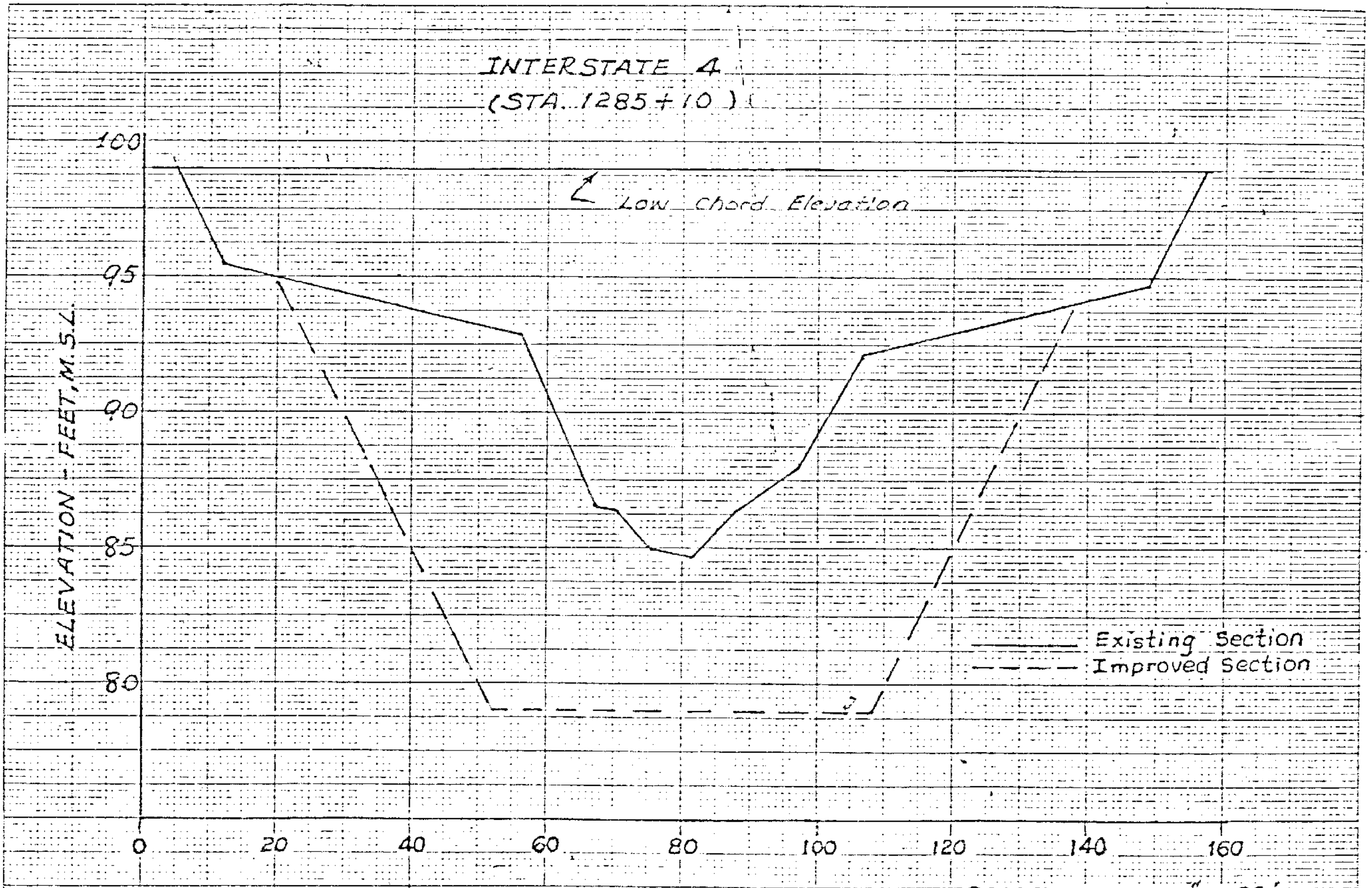

INTERSTATE 4
(STA. 1285 + 10)
Low Chord Elevation
ELEVATION - FEET, M.S.L.
100
95
90
85
80
0
20
40
60
80
100
120
140
160
Existing Section
Improved Section
SCALE : HOR. 1" = 20'
VERT. 1" = 5'

FIGURE 4D

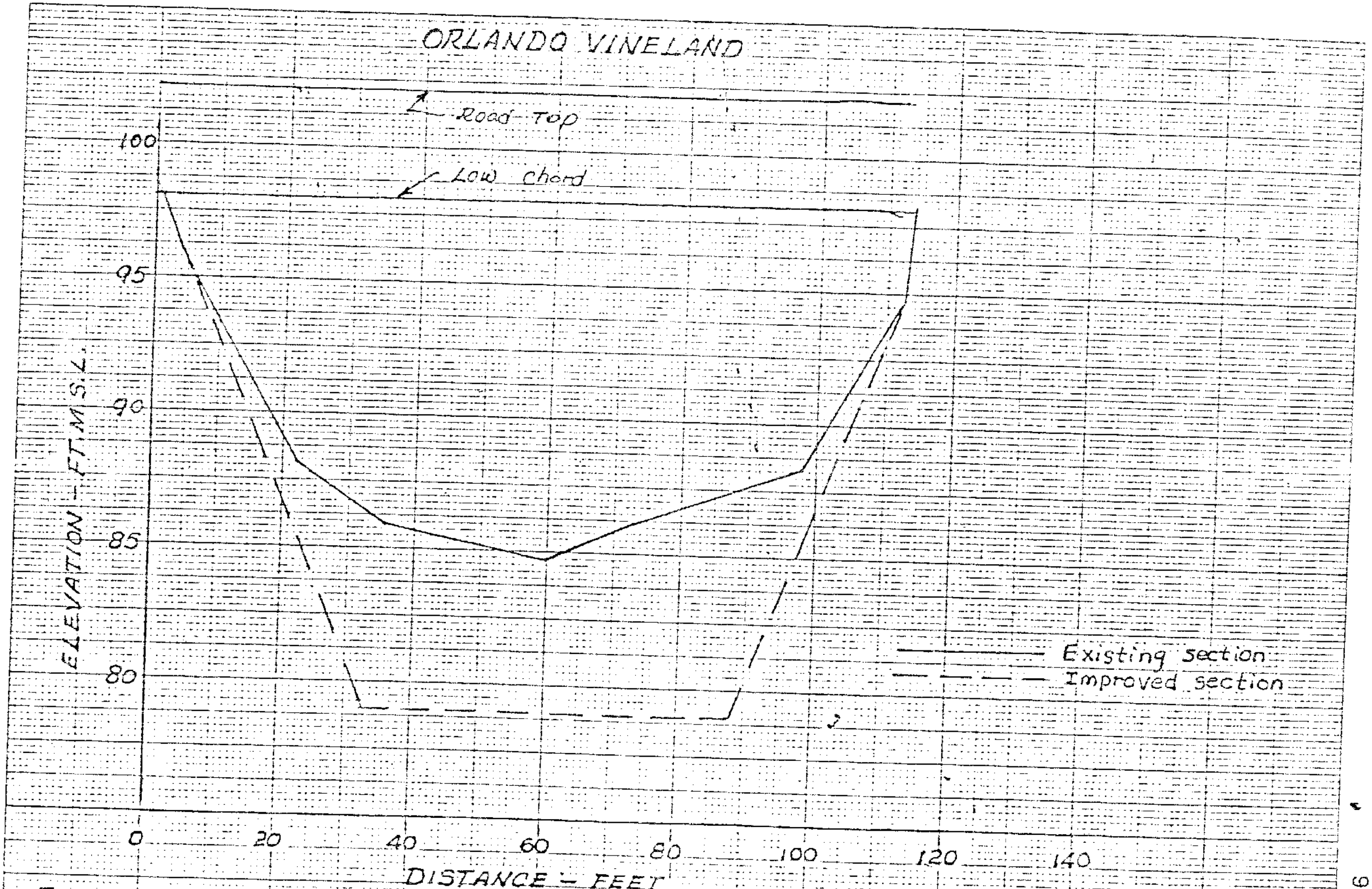

ORLANDO VINELAND
Road Top
Low Chord
ELEVATION - FT. M.S.L.
100
95
90
85
80
0
20
40
60
80
100
120
140
DISTANCE - FEET
Existing section
Improved section
SCALE: HOR. 1" = 20'
VERT. 1" = 5'

FIGURE 5D

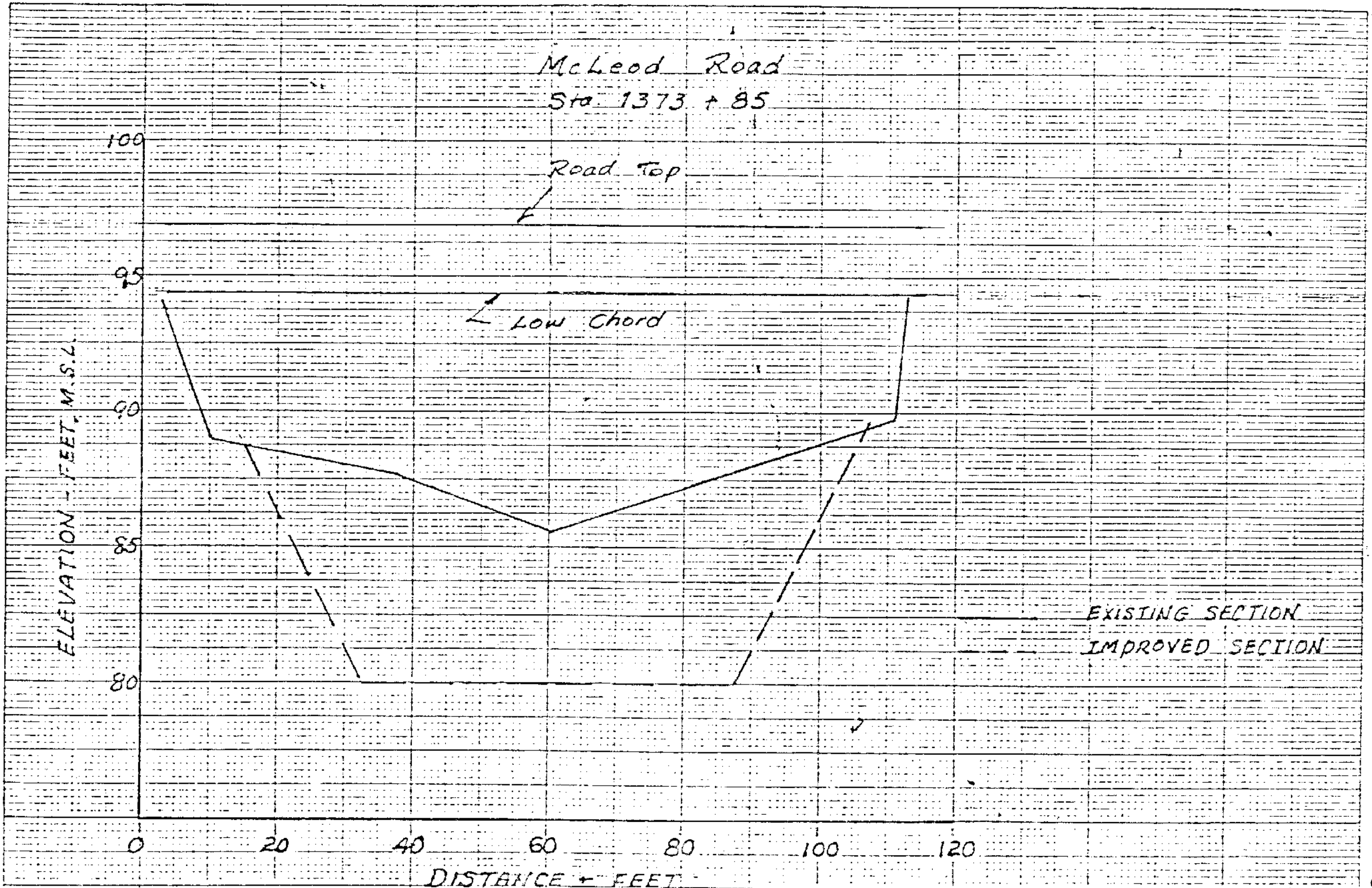
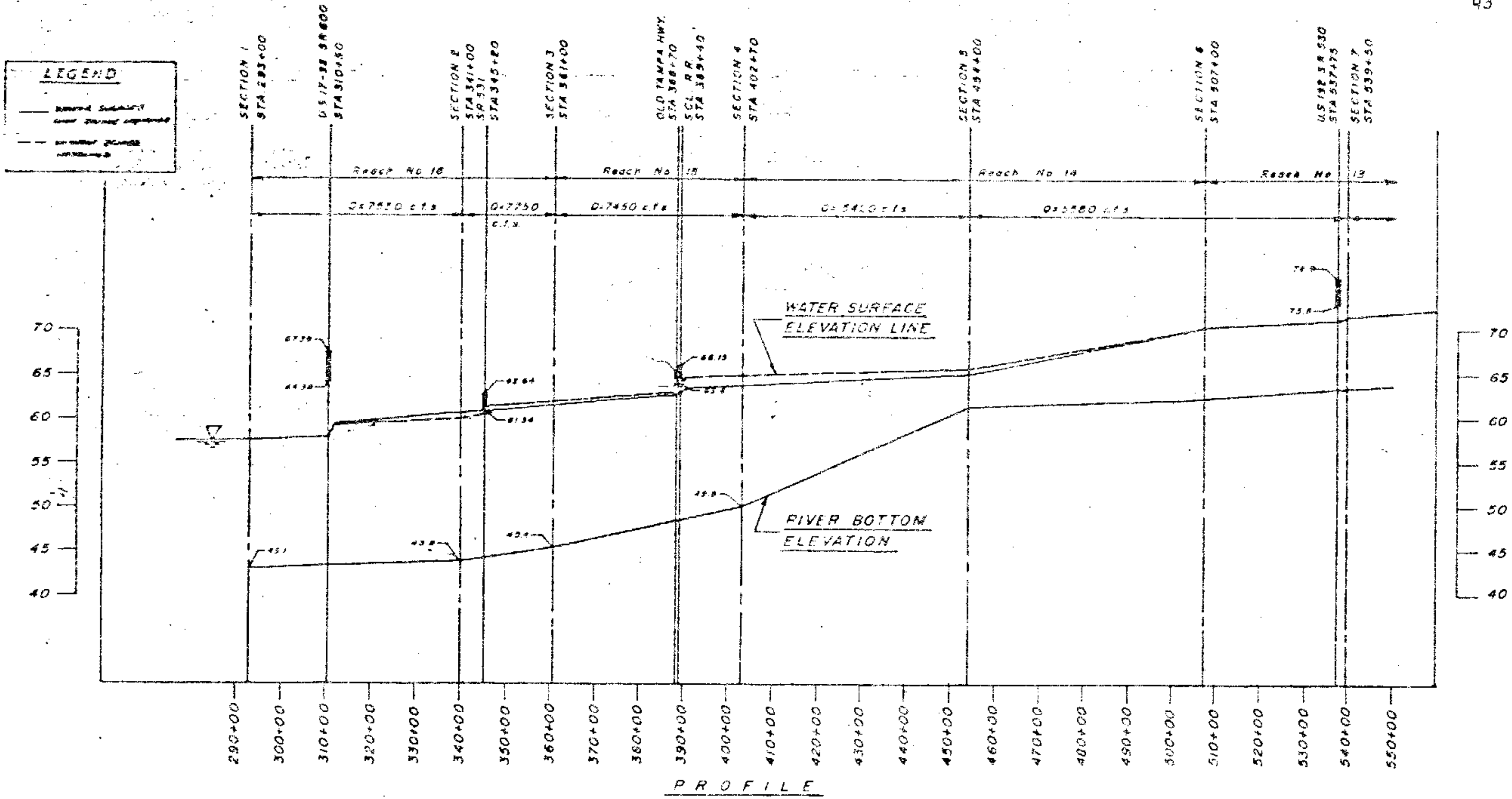


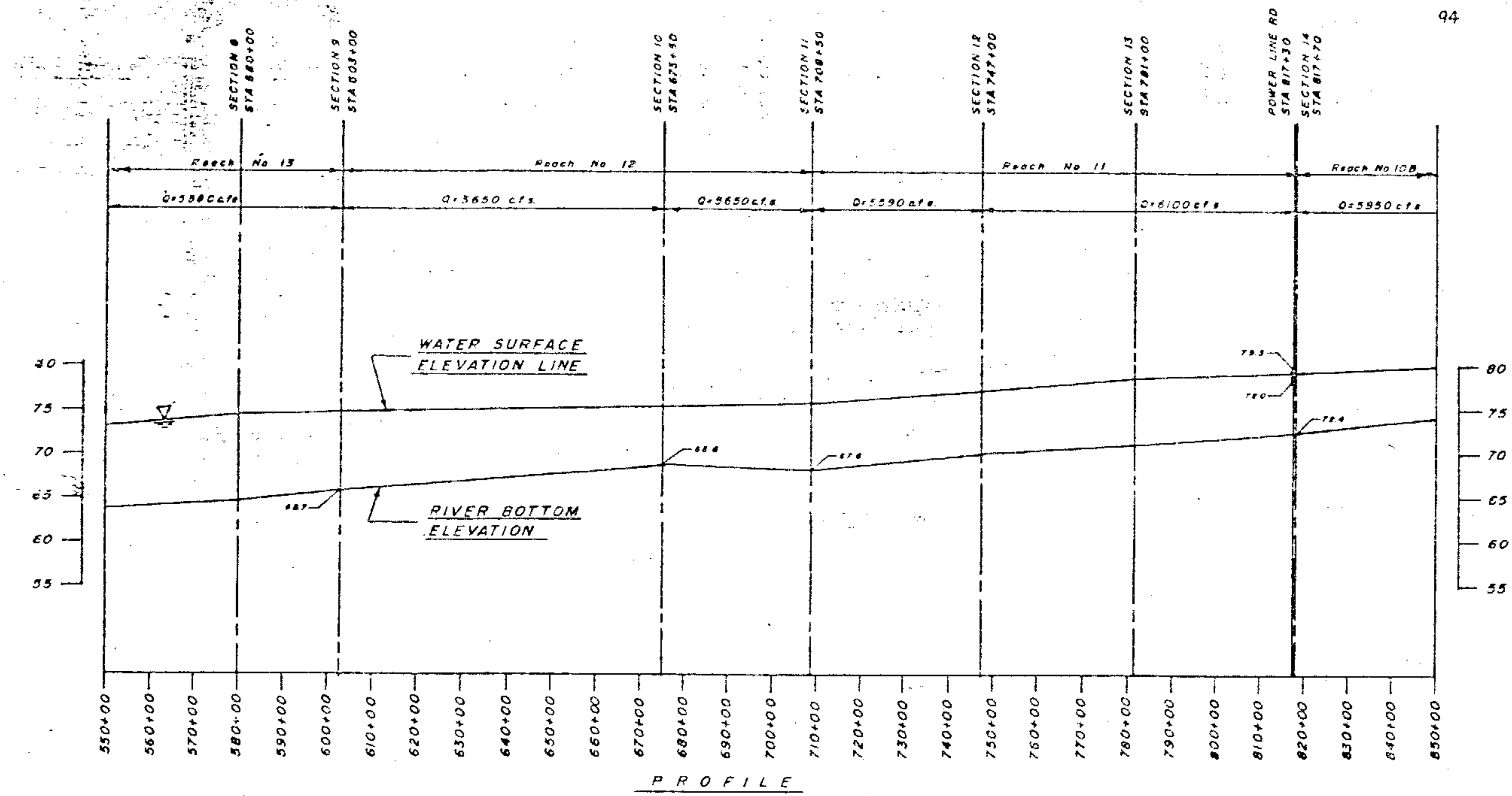
FIGURE 6D

SCALE: HOR 1" = 20'
VERT 1" = 5'



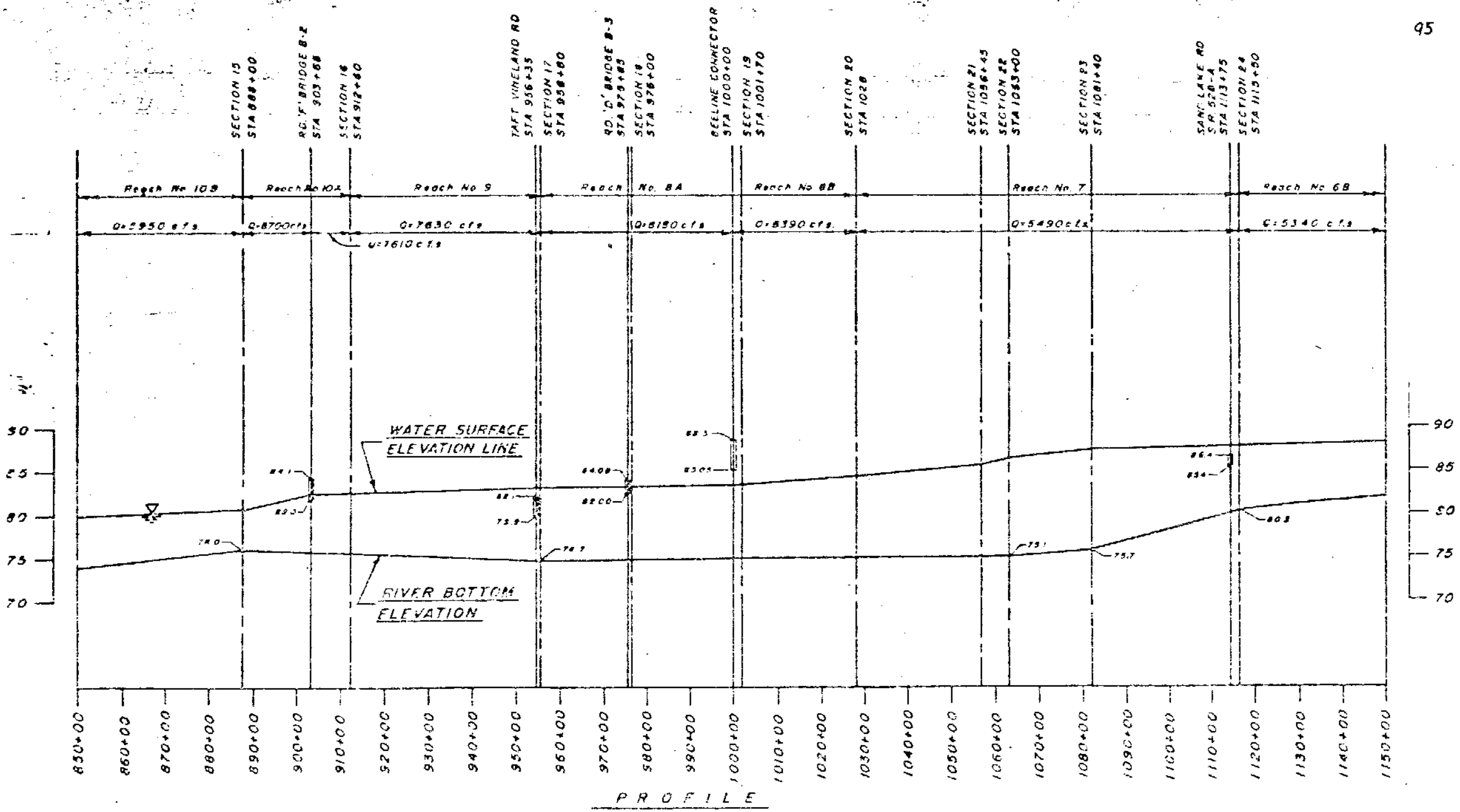
WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, (WITH CHANNELIZATION NORTH OF TURNPIKE)
STA. 290 TO STA. 550

FIGURE 7D



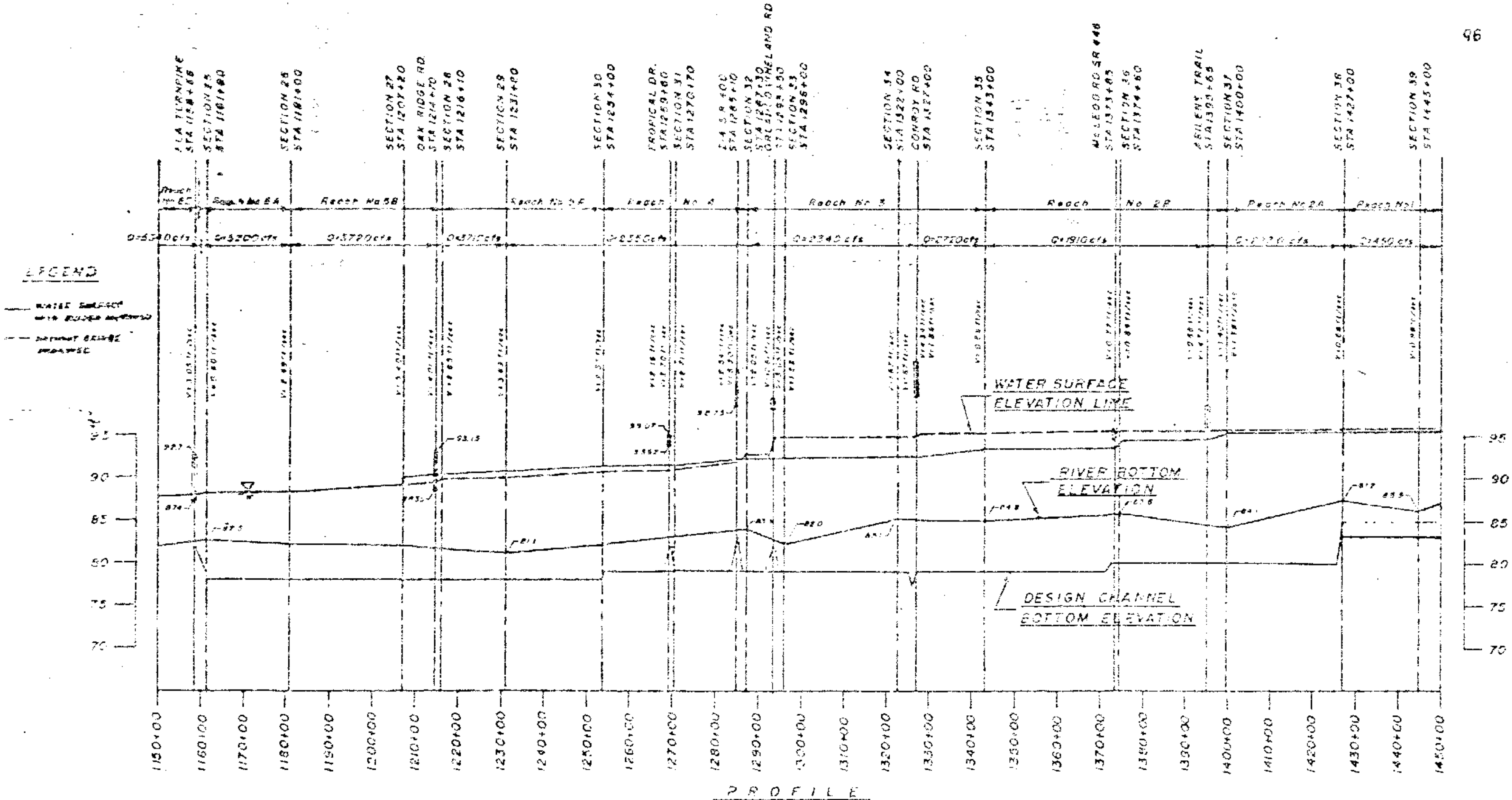
WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, (WITH CHANNELIZATION NORTH OF TURNPIKE)
STA. 550 TO STA. 850

FIGURE 8D



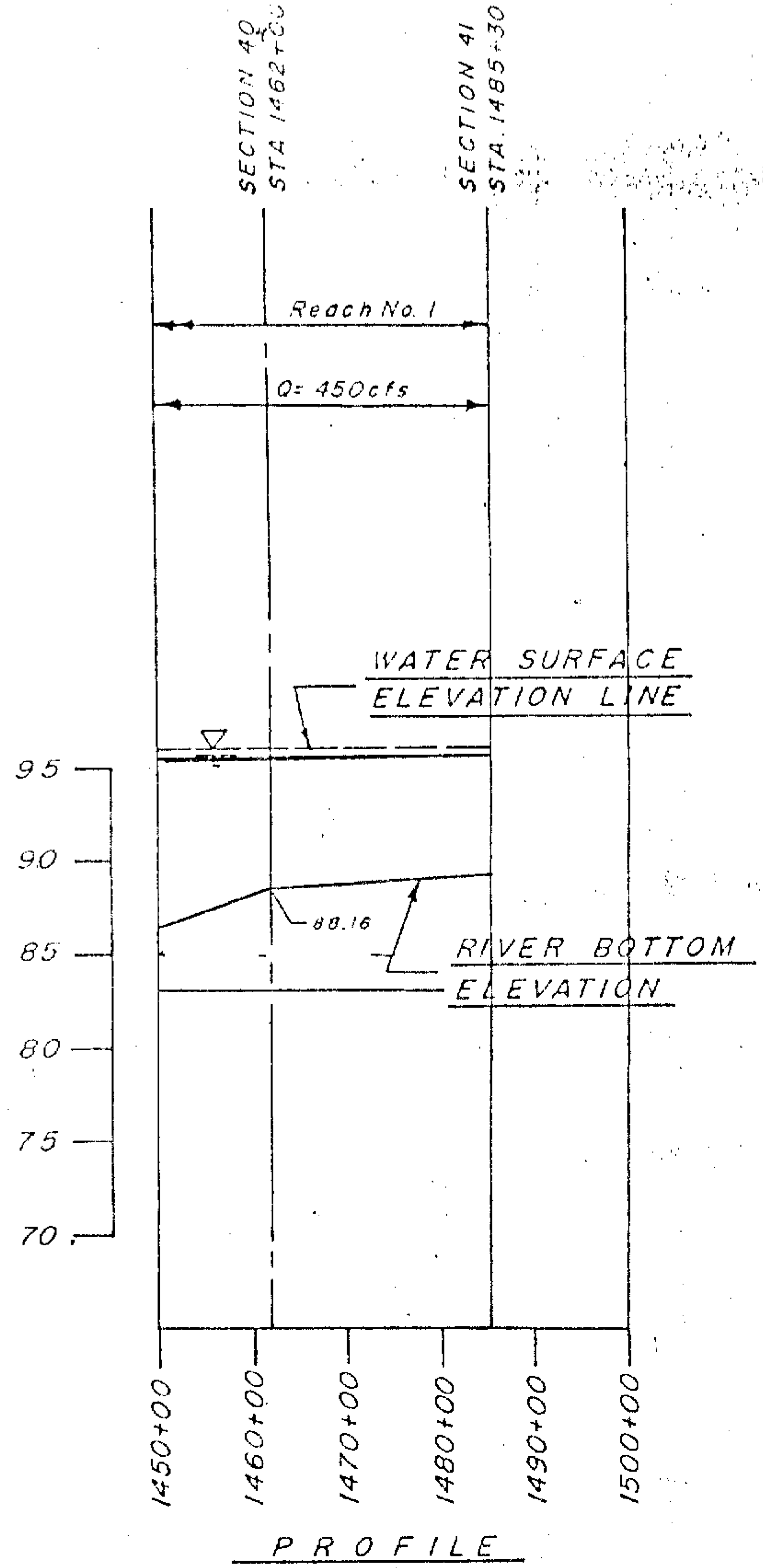
WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, (WITH CHANNELIZATION NORTH OF TURNPIKE)
STA. 850 TO STA. 1150

FIGURE 9D



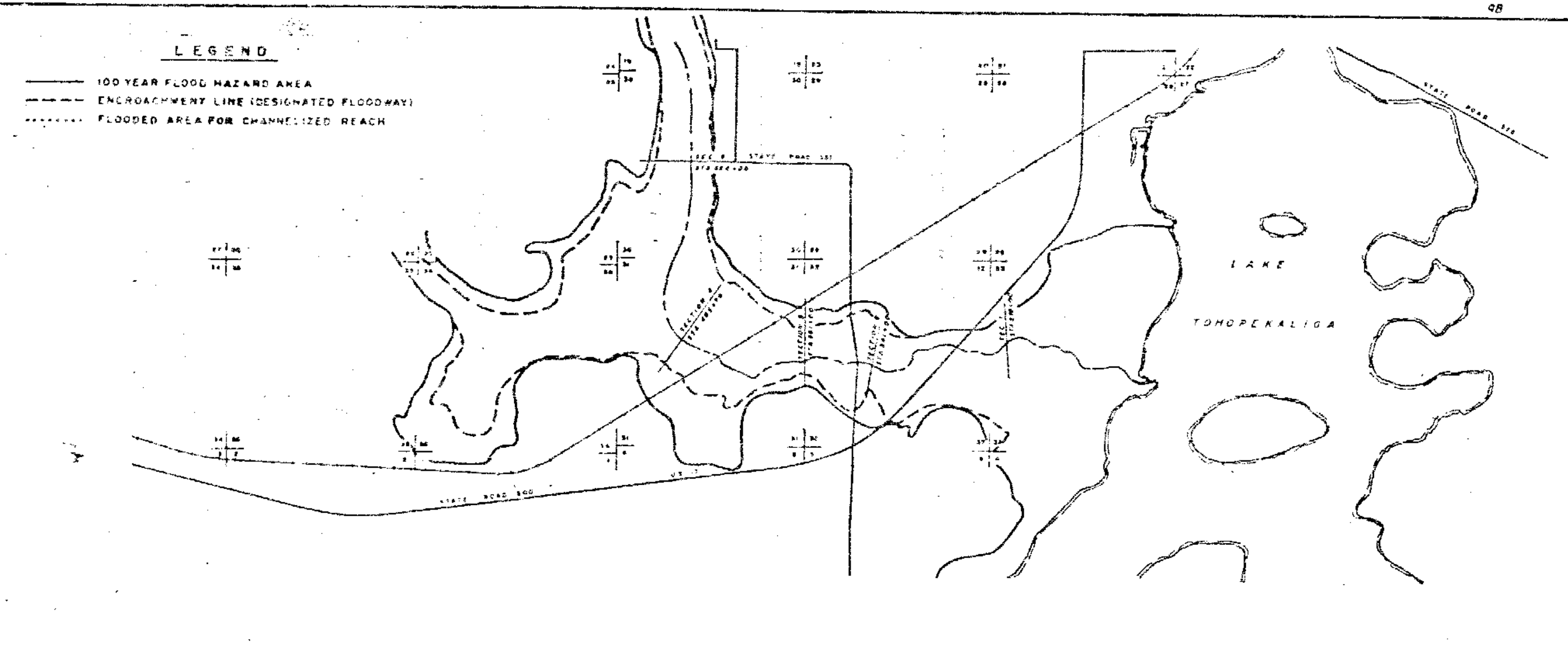
WATER SURFACE ELEVATION LINE, 100 YEAR FLOOD, (WITH CHANNELIZATION NORTH OF TURNPIKE)
STA. 1150 TO STA. 1450

FIGURE 10D



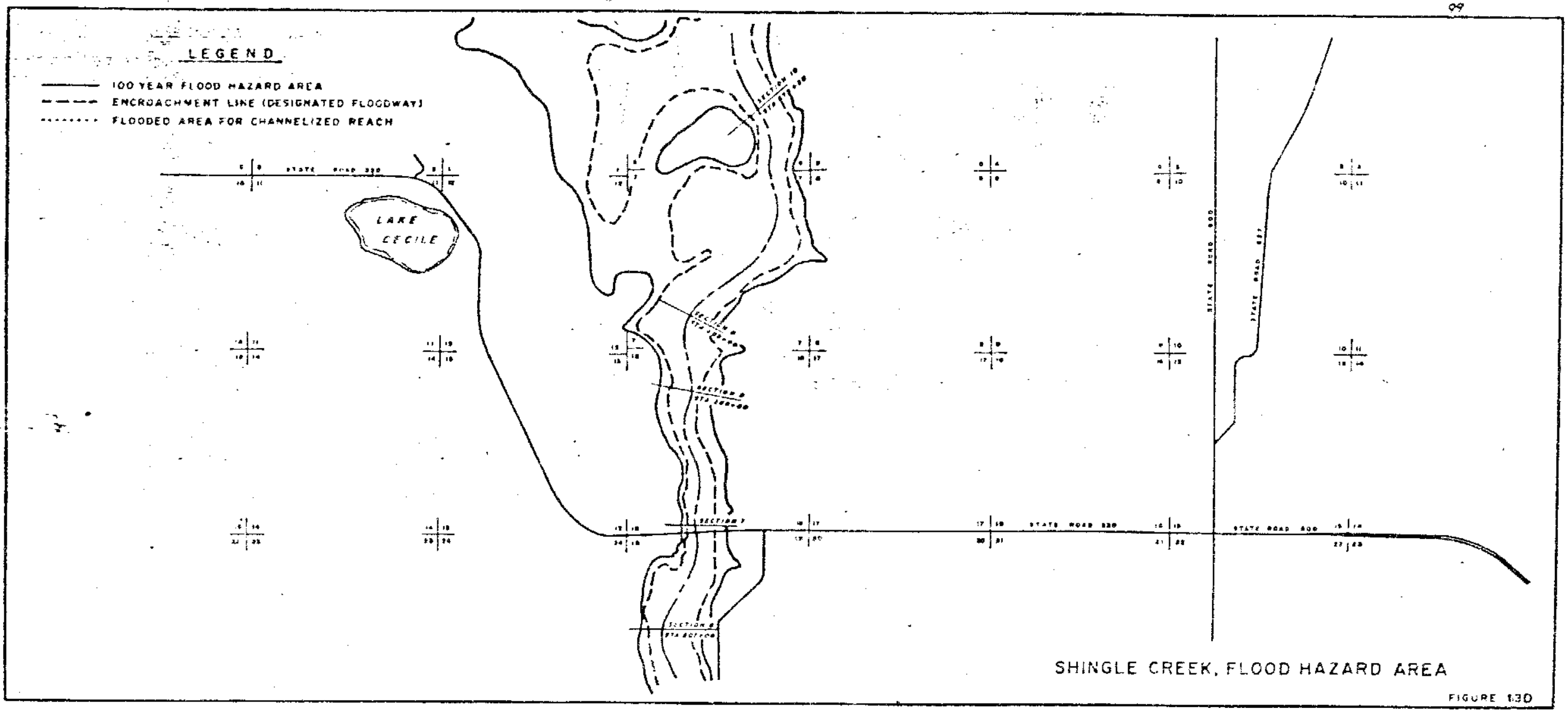
WATER SURFACE ELEVATION LINE,
100 YEAR FLOOD, (WITH CHANNELIZATION
NORTH OF TURNPIKE) STA. 1450 TO STA. 1500

FIGURE 11D



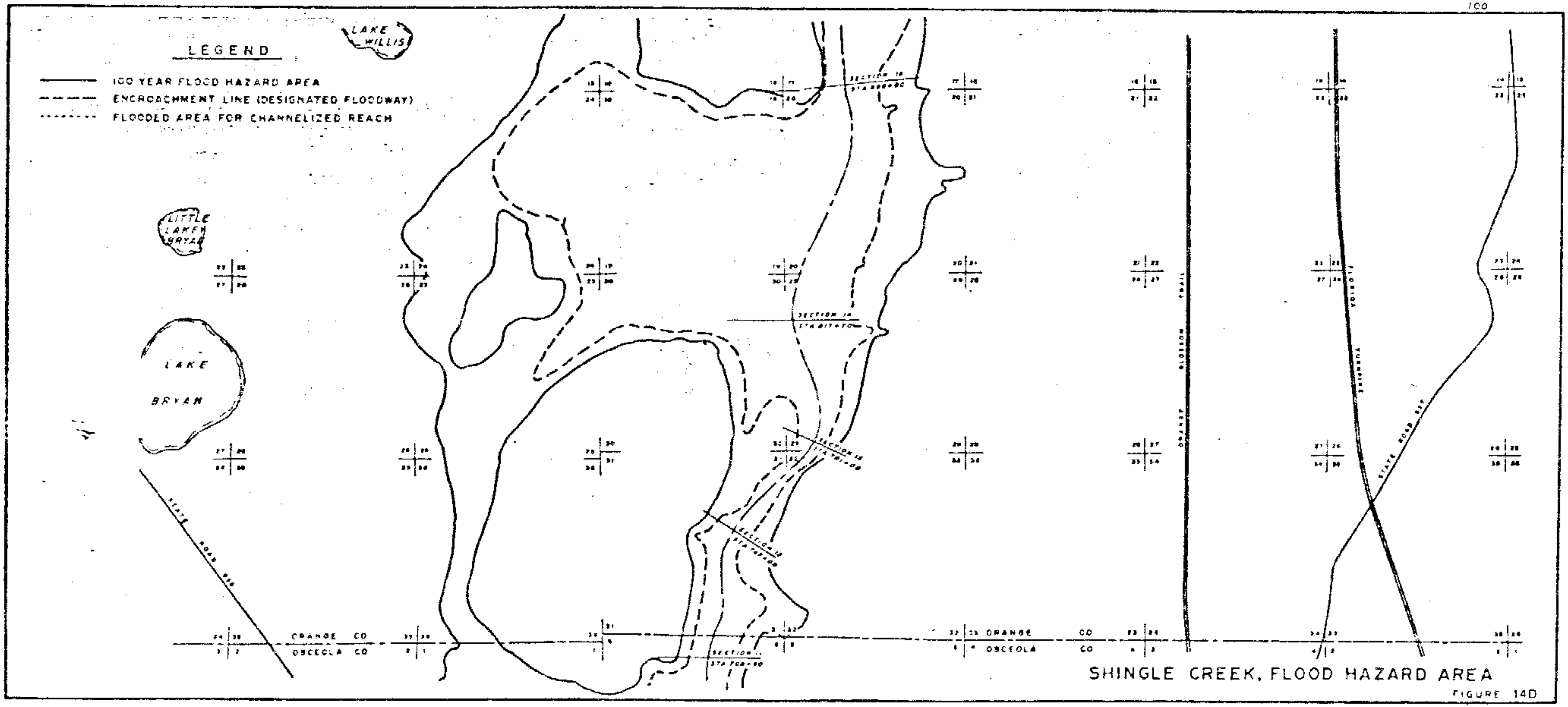
SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE 12D



SHINGLE CREEK, FLOOD HAZARD AREA

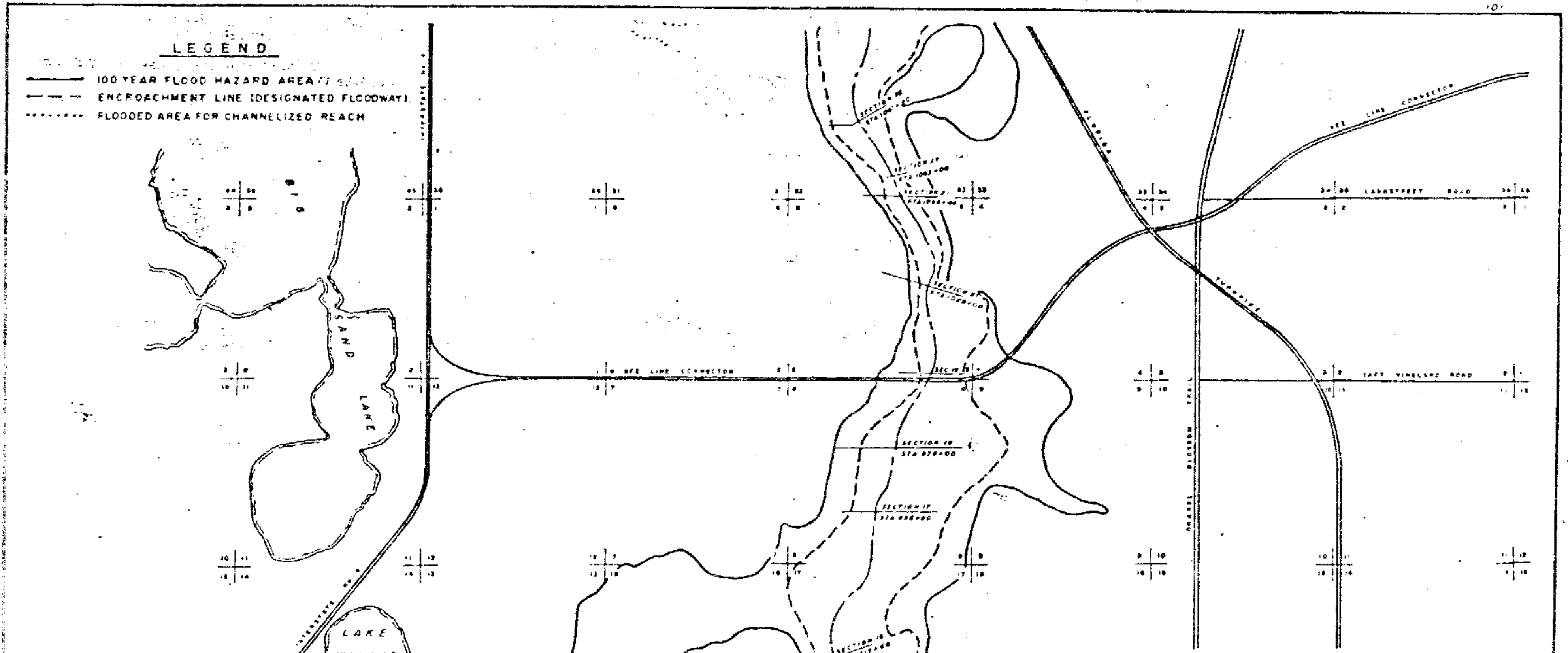
FIGURE 13D



SHINGLE CREEK, FLOOD HAZARD AREA

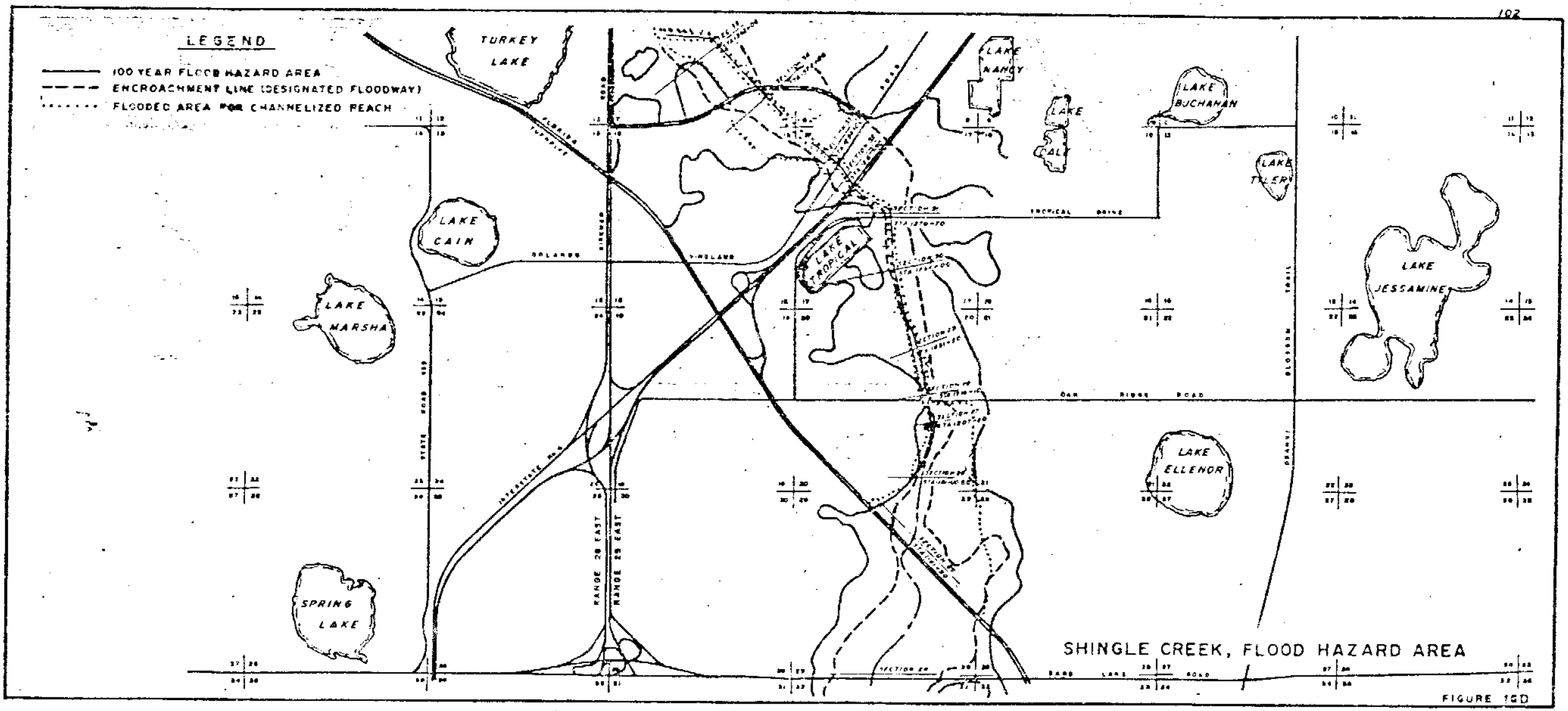
FIGURE 14D

101



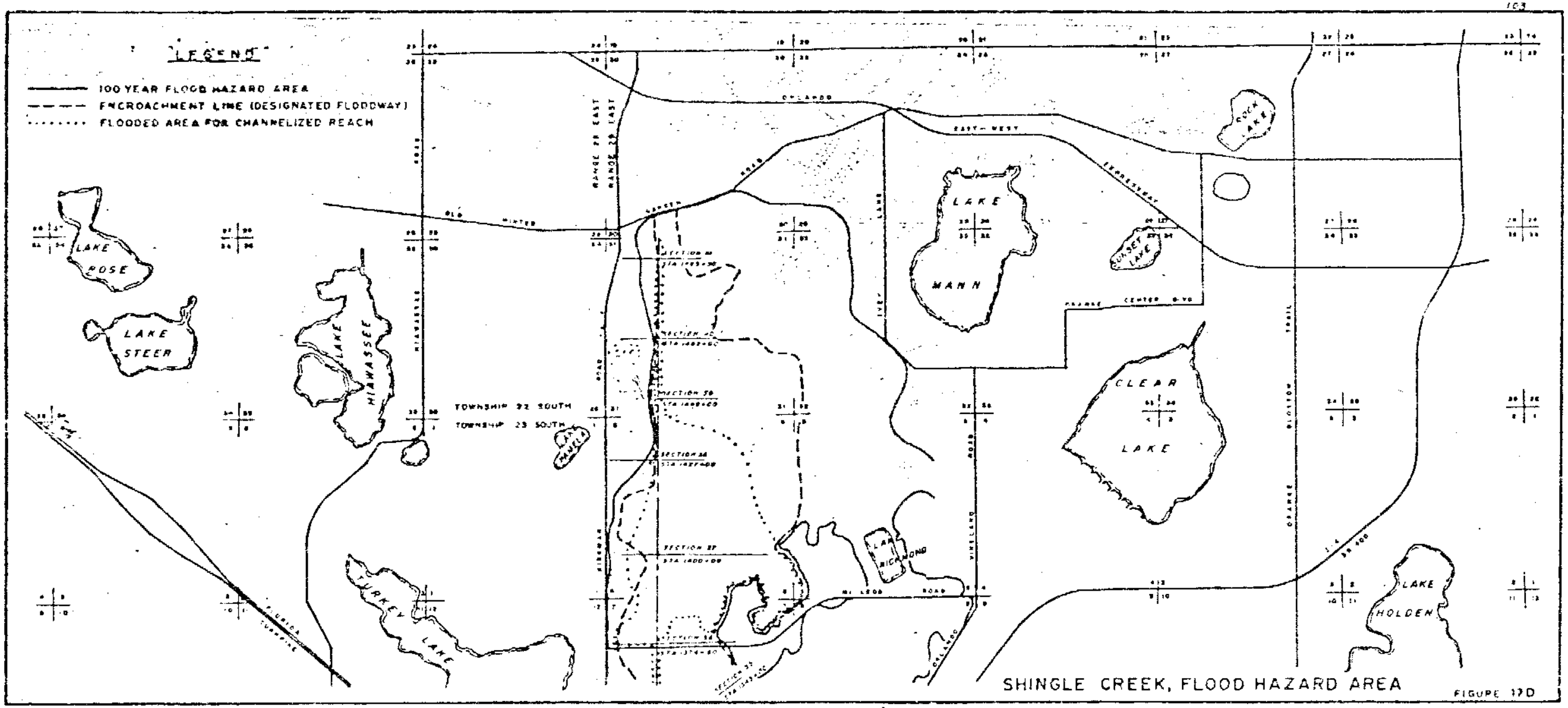
SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE 14D



SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE 10D



SHINGLE CREEK, FLOOD HAZARD AREA

FIGURE 17D